HATCHERY SCIENTIFIC REVIEW GROUP

Puget Sound and Coastal Washington Hatchery Reform Project

A Scientific and Systematic Redesign of Hatcheries Programs to Help Recover Wild Salmon and Support Sustainable Fisheries

HATCHERY REFORM RECOMMENDATIONS

Prepared By,

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❖ Introduction

The Hatchery Reform Project

There are approximately 100 hatchery facilities in Puget Sound and Coastal Washington operated by the Washington State Department of Fish and Wildlife (WDFW), Puget Sound and Coastal Indian Tribes and Nations, and the US Fish and Wildlife Service (USFWS). In operation for decades, most hatcheries were built to produce fish for harvest, compensating for declines in naturally spawning salmon populations.

Hatcheries are very important to the North Pacific sports and commercial fishing economy. In 1992, production for all species at Pacific Rim hatcheries totaled more than 5.5 billion fry, fingerlings and smolts released. In 1999, more than 17 million chinook, coho and steelhead were released into Washington's coastal waters. In the Hood Canal and Puget Sound areas, more than 88 million chinook, chum, coho, sockeye, pink and steelhead were released.[1] Hatcheries provide over 90% of the inland catch of resident salmonids[2], approximately 75% of all coho and chinook, and 88% of all steelhead harvested statewide.[3]

Hatcheries also play an important role in meeting tribal treaty harvest obligations. Federal court rulings have affirmed tribal treaty harvest rights and established the tribes as co-managers of the salmon resource. These rulings have also affirmed that the tribal treaty right incorporates an environmental right, requiring state and federal governments to prevent salmon habitats from becoming degraded. In other words, state and federal governments must ensure that there are salmon available for the tribes to harvest. As wild salmon stocks declined over the years, the tribes and state and federal governments became dependent on hatcheries to provide a meaningful level of harvest for Indian and non-Indian fishers.

Hatcheries have generally been successful at fulfilling these purposes. However, they have also been identified as one of the factors responsible for the depletion of naturally spawning salmon stocks. Some facilities have created stresses for naturally spawning fish, kept smolts from getting downstream and spawning fish from getting upstream, and lowered water quality. Physical and genetic interactions between naturally spawning and hatchery fish may have weakened natural stocks. Hatchery management decisions have often been piecemeal, not system-wide.

With several Puget Sound and Coastal salmon and steelhead stocks listed or proposed for listing under the federal Endangered Species Act (ESA), producing fish for harvest can no longer be the sole purpose of hatcheries. As part of a larger recovery process, state, tribal and federal managers of Washington's salmon and steelhead resources must ensure that their hatcheries do not present a risk to listed species. But the managers are going beyond merely complying with ESA directives that hatcheries be operated to minimize risks to endangered fish. The new approach is to reform hatchery programs to provide *benefits* to the process of recovering naturally spawning salmon and providing

[1] *Washington State Department of Fish and Wildlife*

[2] *Washington Department of Fish and Wildlife September 1997 Final Environmental Impact Statement for the Wild Salmonid Policy, Washington Department of Fish and Wildlife, 600 Capitol Way North, Olympia, WA 98501.*

[3] *Washington State Department of Fish and Wildlife*

sustainable fisheries. The managers have established a Hatchery Reform Coordinating Committee (Coordinating Committee) to work together on implementation of this reform effort.

In May 1999, a group of leading scientists presented its recommendations in a report entitled *The Reform of Salmon and Steelhead Hatcheries in Puget Sound and Coastal Washington to Recover Natural Stocks While Providing Fisheries*. The report determined that the potential exists for hatcheries to have a major positive impact on the recovery of naturally spawning salmon, in just a few years and at relatively small costs. The team called for a comprehensive hatchery reform effort, led by a panel of independent scientists, to conserve indigenous genetic resources; assist with the recovery of naturally spawning populations; provide for sustainable fisheries; conduct scientific research; and improve the quality and cost-effectiveness of hatchery programs.

With the support of then-Senator Slade Gorton (R-WA), Senator Patty Murray (D-WA), Congressman Norm Dicks (D-WA) and Washington Governor Gary Locke, the US Congress adopted and funded the recommendations in fiscal year 2000, launching the Puget Sound and Coastal Washington Hatchery Reform Project. The project is a systematic, science-driven redesign of how hatcheries will be used to achieve new purposes:

1) helping to recover and conserve naturally spawning populations; and
2) supporting sustainable fisheries.

The appropriations language provided funding to:

- Establish an independent scientific panel to ensure a scientific foundation for hatchery reform;
- Provide a competitive grant program for needed research on hatchery impacts;
- Support state and tribal efforts to implement new hatchery reforms; and
- Provide for the facilitation of a reform strategy by an independent third party.

The Hatchery Scientific Review Group

The Hatchery Scientific Review Group (Scientific Group) is the independent scientific panel established by Congress to evaluate hatchery reform programs in Puget Sound and Coastal Washington. The objective of the Scientific Group is to assemble, organize and apply the best available scientific information to provide guidance to policy makers who are implementing hatchery reform.

The Scientific Group is composed of five independent scientists (selected from a pool of candidates nominated by the American Fisheries Society) and four agency scientists designated by WDFW, the Northwest Indian Fisheries Commission (NWIFC), NMFS and USFWS. Like the independent scientists, the agency scientists are responsible for evaluating scientific merits and are not to represent agency policies. The nine scientists serving on the Scientific Group have a broad range of experience. Their scientific disciplines range from biology, genetics, ecology, fisheries, fish culture, fish pathology, and biometrics to other disciplines. Members include:

- John Barr, NWIFC (Vice Chair)
- Lee Blankenship, WDFW (Vice Chair)
- Donald Campton, PhD, USFWS
- Trevor Evelyn, PhD, Department of Fisheries and Oceans Canada (retired)

- Conrad Mahnken, PhD, NMFS Manchester
- Lars Mobrand, PhD, Mobrand Biometrics (Chair)
- Robert Piper, USFWS, Bozeman, MT (retired)
- Lisa Seeb, PhD, Alaska Dept. of Fish & Game
- William Smoker, PhD, University of Alaska

The third party facilitator specified by Congress is Long Live the Kings (LLTK), a private, non-profit organization whose mission is to restore wild salmon to the waters of the Pacific Northwest. LLTK's role includes providing facilitation and staff support to the scientific panel and the Coordinating Committee; and helping the managers communicate hatchery reform progress to Congress, state legislators, stakeholder groups and the public. LLTK was also invited to serve on the Coordinating Committee. It is the managers' responsibility to evaluate the scientific recommendations and make decisions on implementation. The Scientific Group and LLTK are responsible for reporting to Congress on progress made in implementing hatchery reforms.

The congressional funding dedicated to supporting state and tribal efforts to implement new hatchery reforms has been used to establish agency science teams. These teams have undertaken a variety of activities that support the hatchery reform process including conducting risk analysis on hatchery programs to meet hatchery ESA requirements; conducting research on hatchery effects and practices that complements the Scientific Group's research grant program (see below); implementing early reforms; gathering data for Scientific Group regional briefing documents; interpreting technical literature for hatchery managers; and otherwise providing technical support to the Scientific Group, the Coordinating Committee, and the regional staff that are participating in the review process.

Applying a Scientific Approach to Hatchery Management

The Scientific Group has developed: 1) a scientific framework to inform its decision making and recommendations; 2) a tool that assesses benefits and risks associated with specific actions and choices in hatchery management; 3) hatchery operational guidelines to implement reform at each facility; 4) a research program to fill information gaps (to date, the Scientific Group has funded two rounds of research on hatchery and rearing environments, physiology and disease , ecological and genetic interactions between hatchery and wild salmonids, and marine environments); and 5) monitoring and evaluation criteria to determine the success of hatchery programs and gather data for research.

The ability to effectively achieve hatchery reform goals is compromised by lack of scientific certainty on many subjects. To reduce this uncertainty, the Scientific Group has awarded over $1.25 million in a competitive grant program to research projects that are helping to answer questions such as how to reduce harvest on wild fish, how to avoid adverse genetic effects of hatchery fish on wild stocks, how to avoid adverse ecological interactions, how to improve hatchery practices, and how to monitor and measure success. Grantees have reported back to the Scientific Group at annual research review meetings and they are making good progress. But there are many questions left to answer and a number of projects that will take more time to bear scientific fruit.

The Scientific Group and Coordinating Committee agreed that it is important to evaluate hatchery programs in the context of the watersheds in which they operate and the goals set for them by the managers. For this reason, they divided Puget Sound and the coast into ten regions, providing an opportunity to make region-by-region recommendations based on: 1) regional management goals for

conservation, harvest and other purposes; 2) stock status (biological significance and population viability); 3) habitat status (current and future); and 4) the particulars of each hatchery program.

This report provides the recommendations developed by the Scientific Group upon reviewing the first three regions during 2001. These reviews were conducted via in-region meetings and supported by a collaborative information gathering and sharing process among the management agencies and the scientists (see *HSRG Scientific Framework and Hatchery Review Program*, described below, for more detail). Subsequent versions of this report will add recommendations on the remaining seven regions as they are reviewed in 2002 and 2003. These ten regions include:

- Eastern Straits
- South Sound
- Stillaguamish/Snohomish Rivers
- Skagit River Basin
- Nooksack/Samish Rivers
- Central Sound
- North Coast
- Grays Harbor
- Willapa Bay
- Hood Canal

Scientific Review Tools Available

A companion document to this report, entitled *HSRG Scientific Framework and Hatchery Review Program*, provides the Scientific Group's full suite of review tools and a description of the regional review process used to apply them, in order to create hatchery reform recommendations. It also provides more detail on the terms and concepts included in this report. This and all other Hatchery Reform Project-related publications are, or will be, available from the project's web site (www.lltk.org/hatcheryreform.html) or by contacting Long Live the Kings at (206) 382-9555.

Components of This Report

Area-Wide Recommendations

This report begins with a chapter of Area-Wide Recommendations, reform measures that apply to the entire Puget Sound and Coastal Washington area.

Regional Reviews

Following the Area-Wide Recommendations are chapters for each of the regions reviewed in 2001. Each of these chapters begins with a general overview of the region and its identified sub-regions, a table containing ratings for all the salmonid stocks in that region (as provided by the managers), followed by reviews and recommendations for each salmonid stock that has an associated hatchery program.

Program Recommendations

Each individual salmonid stock program review and recommendations section begins with a listing of the managing agency(s) and/or tribe and a table that provides the current, short-term (10–12 year) and long-term (50 year) stock goals and associated hatchery program purpose and type, as they were

expressed to the Scientific Group by the managers during the regional review process (see example below). Following the example table are definitions of each rating included in the table.

Stock Goals:	**Current**	**Short-Term**	**Long-Term**
Biological Significance	High	High	High
Population Viability	Critical	Critical	At Risk
Habitat	Inadequate	Inadequate	Limiting
Harvest Opportunity	None	None	Occasional
Hatchery Program:			
Purpose	Conservation		
Type	Integrated		

Biological significance is determined by considering a number of specific factors relating to stock origin, biological attributes and population subdivisions (see *HSRG Framework and Hatchery Review Program* for more detail), with the stock defined as being of either *low*, *intermediate* or *high* significance.

Population viability is also determined by considering a number of specific factors such as age class structure, spawner escapement and proportion of hatchery-origin fish in natural spawning (see *HSRG Framework and Hatchery Review Program* for more detail), with the stock's viability defined as being either *critical*, *at risk* or *healthy*. This rating refers to the stock's ability to sustain itself in the natural environment (except in the case of a segregated harvest program, in which case the ratings are *low*, *medium* and *high* and refer to the stock's ability to sustain itself in the culture environment).

The stock's spawning, freshwater, migration and estuarine **habitat** is rated as either *inadequate* (target stock is unproductive and the population will go extinct, even without terminal harvest), *limiting* (target stock is productive enough for the population to sustain itself at a low level terminal harvest) or *healthy* (productivity of the stock is high and the population is capable of growth and supporting significant terminal harvest).

Harvest opportunity is rated according to whether the goal is to provide *no* directed harvest opportunity, *occasional* opportunity, opportunity *most years*, or opportunity *each year*.

The **purpose** of the hatchery program is defined as either *conservation*, *harvest*, *both* and/or another purpose (such as *education*, *research* or *cultural/ceremonial*).

The **type** of program is also included. Hatchery programs are classified as *integrated* if the goal is to minimize potential genetic divergence between the hatchery broodstock and the naturally-spawning population in the watershed where fish are released and returning adults trapped for broodstock. *Segregated* programs are classified as those in which the goal is to maintain the hatchery population as a distinct, or genetically segregated population.

Following this table, each stock review and recommendations section includes: 1) the Program Description as provided by the managers[4], 2) Operational Considerations (elements recognized by the Scientific Group in considering the way the program is currently being operated), 3) the Benefits and Risks being conferred by the program on the target stock and other regional stocks, 4) the Recommendations from considering benefits and risks, 5) a section for other Comments on the program from the Scientific Group, and 6) a section for a Response to the review and recommendations from the relevant management agency(s) and/or tribes.

This report focuses primarily on issues that need to be addressed and recommends changes that need to be made. It should not be read as a complete review listing every positive attribute alongside those that need to be changed. After reviewing over 40 programs in three regions, the Scientific Group has been very impressed by the diligence—and frequently the ingenuity—with which the state and tribal staffs carry out their programs, and with their dedication to the resource.

It is important to note that the recommendations contained in this document are based upon current goals and the best scientific information available at the time the reviews were conducted. In keeping with the tenets of adaptive management[5], it will be necessary to review and adapt these recommendations as new scientific information arises and/or goals change.

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4 *Information about Genetic Diversity Units (GDUs) and broodstock origin included in these program descriptions provided by Washington State Department of Fish and Wildlife staff, January 2002; GDU information is based on Busack, C. and J. B. Shaklee. 1995. Genetic Diversity Units And Major Ancestral Lineages Of Salmonid Fishes In Washington. Washington State Department of Fish and Wildlife, Technical Report No. RAD 95-02.*

5 *See HSRG Scientific Framework and Hatchery Review Program chapter on Emerging Issues in Hatchery Management for a full discussion on adaptive management.*

❖Area-Wide Recommendations

Take a Regional Approach to Managing Hatchery Programs

The Scientific Group and the managers agreed that it is important to evaluate hatchery programs in the context of the regions and watersheds in which they operate and the goals set for them by the managers. Having reviewed three regions, the Scientific Group has determined that this approach is not only important, but vital to the success of the process. This same regional approach will be essential to the implementation of hatchery reform. This will obviously take a high degree of coordination between and among managers. Experience to date indicates that the regions selected for this process are appropriate, in that they are based on geography, drainages, stock assemblages and shared goals. The Scientific Group recommends that implementation be coordinated by regional technical groups, either those currently in existence or ones patterned on the regional participant lists generated for the review process.

Operate Hatcheries Within the Context of Their Ecosystems

The benefits and risks of hatcheries can only be properly evaluated in the context of their ecosystems. The current and future status of these ecosystems, including the status of naturally spawning stocks and the environment, will determine the potential for success and the limitations on any hatchery program.

Measure Success in Terms of Contribution to Harvest and Conservation Goals

In the past, hatchery programs have too often been evaluated on the basis of the number of fish released. This is akin to evaluating a farm by the number of seeds planted. More appropriate measures of success include fish quality (see below), harvest opportunity and adults returning to reproduce and sustain the stock. In the future, hatcheries may also be evaluated on the basis of their contribution to the ecosystem as a whole[6].

Emphasize Quality, Not Quantity, in Fish Releases

The Scientific Group's working model is that the best a hatchery program can expect to do is to match a wild salmonid template in terms of the physiological, morphological and behavioral traits that affect smolt-to-adult performance. It is important that some measure of the quality, rather than simply the quantity, of fish released from hatcheries be measured and evaluated in a regional context. The Scientific Group is preparing a paper addressing this issue[7].

Incorporate Flexibility into Hatchery Design and Operation

Facilities should be designed and operated in such a way that they are able to respond relatively easily to changes in harvest and conservation goals and priorities, ocean carrying capacity, stock status, freshwater habitat conditions, and the myriad other factors that will alter current policies and programs. Programs must also be able to respond to uncertainty and risk. For example, an empty raceway today may be necessary to provide this type of flexibility in the future. The keys to flexibility are having sufficient supplies of land, water quality and quantity, and physical facilities; along with a

[6] *See HSRG Scientific Framework and Hatchery Review Program, Emerging Issues chapter, section on ecological significance.*

[7] *See HSRG Scientific Framework and Hatchery Review Program, Emerging Issues chapter, section on smolt quality.*

planning mindset that takes the concepts of flexibility, managing change, and future needs into account.

Evaluate Hatchery Programs Regularly to Ensure Accountability for Success

Hatchery reform will require expanded monitoring and evaluation (M&E), with some level of commonality and standardization across Puget Sound and Coastal Washington. Each region of Puget Sound and the coast will need to develop its own M&E program consistent with the goals and programs of that region. Monitoring should include not only an expanded effort in tagging and marking subsets of all major hatchery production groups and recording of hatchery production parameters, but also determining the fate of migrants in fresh and saltwater environments following release. An integrated, region-wide hatchery M&E system needs to be developed that includes the systematic and annual evaluation of the co-mingling of hatchery and natural fish. Furthermore, a modern, centralized M&E database that is evaluated annually for adherence to regional and area-wide goals needs to be institutionalized, in order to adaptively manage the system.

Develop a System of Wild Steelhead Management Zones

The Scientific Group infers that the managers intend to operate segregated steelhead programs (as defined in the introduction of this report) throughout Puget Sound and the coast, to provide a steelhead harvest opportunity. In general, the Scientific Group has found that the ecological and genetic risks of this approach outweigh the benefits. The biggest concern is the genetic risk posed by the spawning overlap between the hatchery, early-timed winter run stock and native, late-timed winter run stock.

The Scientific Group recommends an entirely new approach to managing steelhead. The managers should develop a system of "wild steelhead management zones" for each region in Puget Sound and Coastal Washington, where streams are not planted with hatchery fish and are instead managed for native stocks. Harvest for steelhead within these zones may be compatible with this approach, but no hatchery-produced steelhead would be introduced. Such zones would reduce the risk of naturally spawning fish interbreeding with hatchery fish, and provide native stocks for future fisheries programs. The streams selected should represent a balance of large and small streams, productivity, etc. Hatchery production may need to be increased in streams selected for hatchery harvest. The Scientific Group encourages the use of locally-adapted stocks for those streams.

When implementing a segregated steelhead program, consideration should be given to minimizing interaction with naturally spawning steelhead, through such tools as differential timing and a decision on benefits versus risks on outplanting in freshwater habitat. In addition, adult collection procedures should be designed to capture as many adults from the returning segregated population as possible.

The managers should organize a workshop to develop this wild steelhead management zone concept. Monitoring and evaluation should be a basic component of the concept, for both wild steelhead management zones and hatchery harvest streams.

Use In-Basin Rearing and Locally-Adapted Broodstocks

Some hatchery programs, for lack of adequate facilities and/or proper escapement management, require the importation and movement of eggs and juveniles into and out of the region. In addition, non-locally adapted broodstocks are sometimes used. These practices result in a loss of local

adaptability and lowered productivity of hatchery stocks and should be ended. The managers should use in-basin rearing and locally adapted broodstocks.

Take Eggs Over the Natural Period of Adult Return

There is reason for concern over the loss of certain life history traits in hatchery stocks through the process of domestication. An example is the shift in spawn timing resulting from the failure to spread hatchery egg take over the natural period of adult return. Natural life history traits of the various hatchery stocks should be conserved or recovered to assure long-term sustainability. The managers should adopt and implement policies that effectuate this objective.

Develop Spawning Protocols to Maximize Effective Population Size

The mating of hatchery fish should strive to achieve two principal objectives: 1) maximize the genetic effective number of breeders; and 2) ensure that every selected adult has an equal opportunity to produce progeny. This is particularly critical in conservation programs, where populations are small or have experienced significant declines. To achieve this, male and female hatchery fish can be mated following pairwise (one male to one female), nested (e.g., one male to three females), or factorial (e.g., three-by-three spawning matrix) designs. One common hatchery practice, the pooling of sperm, can reduce effective population size, since equal contributions of individual males are not assured.

During its review of hatchery programs in the initial three regions, the Scientific Group saw a variety of spawning protocols, including modified factorial mating[8], single family pairing, as well as protocols that pool gametes prior to fertilization. The approaches of single family mating and modified factorial mating have proven to be feasible and effective (up to 94% fertilization) even in some of the largest programs reviewed (up to five million eggs taken per year). Because these methods achieve the two principle objectives and can be implemented relatively easily, the Scientific Group recommends that all programs, up to the size noted, adopt one of these protocols.

Take Into Account Both Freshwater and Marine Carrying Capacity in Sizing Hatchery Programs

Stocks of coho and chinook have shown a decrease in survival over the past decade in certain regions of Puget Sound and the coast, such as southern Puget Sound. The decrease may be related to the general decline in productivity of marine waters. There has been a great deal of speculation as to additional cause(s) for the decline in these regions, (e.g., increased bird and marine mammal predation; a general lowering of water quality from urbanization in a body of water with low turnover; continuing loss of freshwater habitat, a shift in the forage base, etc). Whatever the cause, there seems to be reduced capacity to support hatchery and naturally spawning salmonids.

Lowered survival may be related to the high biomass of salmonids presently being released from hatcheries. Because of scientific uncertainty associated with lowered hatchery productivity, production should not be increased until the managers have a better understanding of factors controlling survival. Closure of certain unproductive hatcheries and reduced production at other

[8] *Currens, K.P., J.M. Bertolini, C.A. Busack, and J. Barr. 1998. An Easier Way to Meet Genetic Spawning Guidelines. Pages 41-44 in Proceedings of the 49th Pacific Northwest Fish Culture Conference, Boise, ID.*

hatcheries may in fact benefit the quality and survival of both naturally spawning and hatchery fish. The Scientific Group is preparing a white paper addressing this issue[9].

[9] *See HSRG Scientific Framework and Hatchery Review Program, Emerging Issues chapter, section on marine carrying capacity.*

❖Eastern Straits

Overview

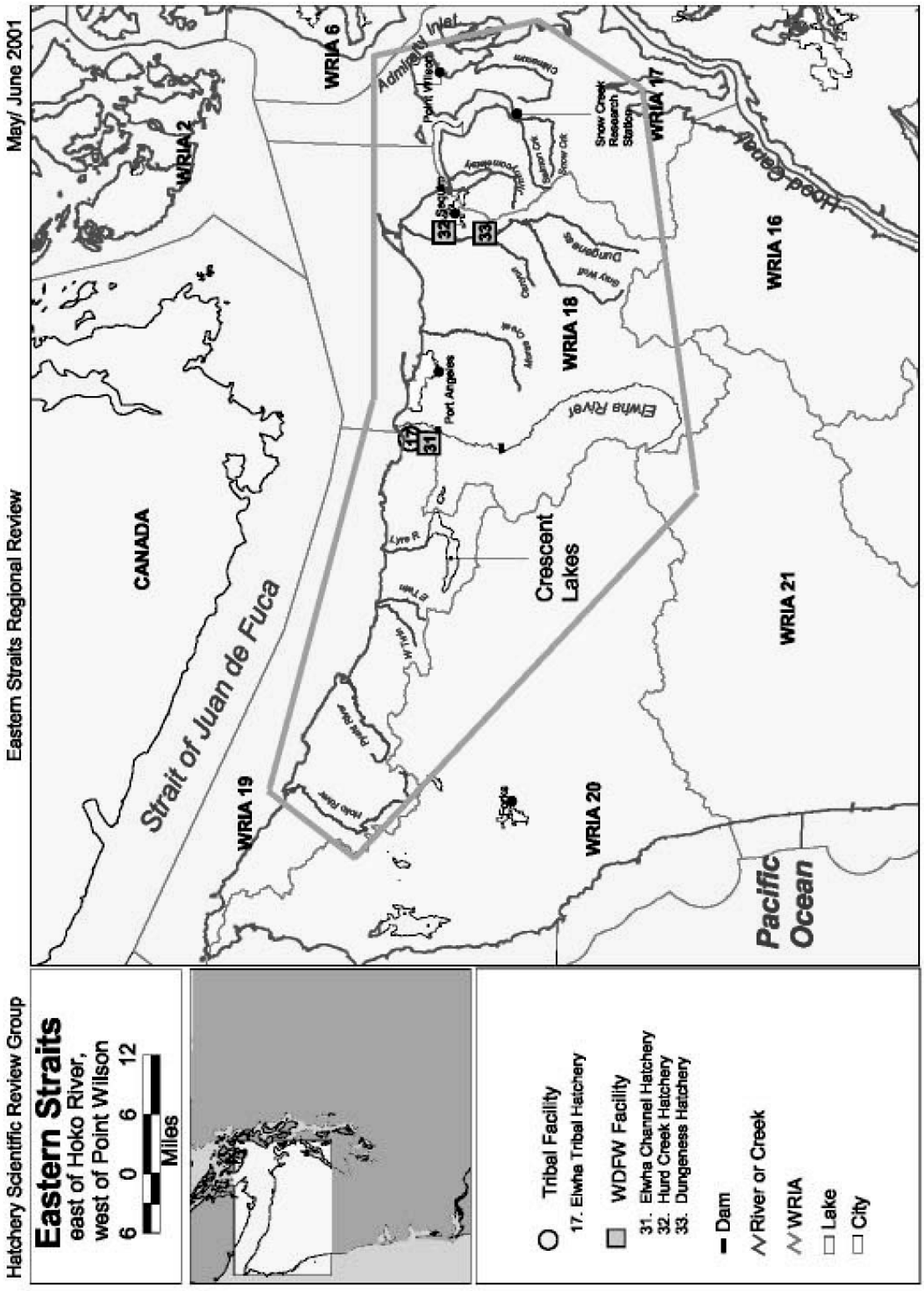
This region includes the eastern portion of the Strait of Juan de Fuca, from Point Wilson to the Hoko River. For the purposes of this review, the Scientific Group and the regional managers divided the region into three sub-regions and reviewed the hatchery programs involving each identified sub-regional salmonid stock (for example, Dungeness chinook). The review included a consideration of the program's effects on all other hatchery and naturally spawning sub-regional salmonid stocks (see table in sub-regional overviews). The sub-regions identified for this region include:

1. Dungeness River Watershed
2. Elwha River Watershed
3. Smaller Watersheds

This chapter provides a general overview of the Eastern Straits and each sub-region, followed by reviews and recommendations for each salmonid stock that has an associated hatchery program.

Habitat in the Eastern Straits is expected to be worse or the same in the short-term, but better in the medium- and, especially, long-term. There are ongoing efforts to modify the Dungeness River dikes to return the river to its meander channels. The upper Elwha River is scheduled to be available as salmon habitat, with the removal of two major dams. The Dungeness River Management Team, the Forest and Fish Initiative, the Critical Areas Ordinance of the Clallam County Growth Management Act, as well as more critical review of projects via the Shorelines Management Act and State Environmental Policy Act, should all combine to slow or reverse the habitat losses of the past. In addition, Jimmycomelately Creek has a lower stream channel and estuary restoration project that will significantly improve conditions for summer chum. Although all these sub-regions currently have much poor quality habitat, they are still producing coho, cutthroat and steelhead, at some level, over a large portion of each sub-region.[10]

[10] *Chris Byrnes, Washington State Department of Fish and Wildlife, May 1, 2001*


Hatchery Scientific Review Group
Eastern Straits Regional Review
May/ June 2001
Eastern Straits
east of Hoko River,
west of Point Wilson
6 0 6 12
Miles
CANADA
Strait of Juan de Fuca
Pacific Ocean
WRIA 2
WRIA 6
WRIA 17
WRIA 16
WRIA 18
WRIA 19
WRIA 20
WRIA 21
Crescent Lakes
Port Angeles
Elwha River
Admiralty Inlet
Point Wilson
Snow Creek Research Station
Head Canal
Tribal Facility
17. Elwha Tribal Hatchery
WDFW Facility
31. Elwha Channel Hatchery
32. Hurd Creek Hatchery
33. Dungeness Hatchery
Dam
River or Creek
WRIA
Lake
City

DUNGENESS

Overview

STOCK STATUS[11]

Stocks	Hatchery Program?	Biological Significance (L=Low, M =Intermediate, H =High)			Population Viability (L=Critical, M = At Risk, H = Healthy)			Habitat (L = Inadequate, M = Limiting, H = Healthy)			Harvest Opportunity (0 = None, L = Occasional, M = Most years, H = Each year)		
		Now	Goals		Now	Goals		Now	Goals		Now	Goals	
			Short-Term	Long-Term		Short-Term	Long-Term		Short-Term	Long-Term		Short-Term	Long-Term
Dungeness Chinook	Y	H	H	H	M	M	H	M	M	H	0	L	M
Dungeness Hatchery Coho	Y	M	M	M	M	M	M	M	M	M	H	H	H
Dungeness Fall Pink	Y	H	H	H	L	L	M	L	L	M	0	0	L
Dungeness Summer Pink	N	H	H	H	M	M	H	M	M	M	0	0	L
Dungeness Chum	N	?	?	?	L	L	?	L	L	M	0	0	0
Dungeness Hatchery Winter Steelhead	Y	M	M	H	L	L	M	M	M	H	L	L	M
Dungeness Summer Steelhead	N	?	?	?	L	L	?	M	M	H	0	0	?

HABITAT

Salmonid habitat condition in the mainstem Dungeness River is currently fair to poor. Major habitat concerns include the diversion of instream flow for irrigation, loss of functional floodplain and estuary in the lower watershed, lack of habitat complexity, substrate instability, and poor riparian condition. Habitat conditions on lower watershed tributaries are also currently impaired. On McDonald, Seibert and Bagley Creeks, habitat concerns include fish access, substrate quality, use of stream for irrigation conveyance, and effects on some tributaries. The mouth of each of these streams is isolated from saltwater during summer months by formation of a natural sandbar across the mouth. This likely effectively limits access and production from these streams.

Upper watershed tributaries in Olympic National Park remain in good condition. There are significant habitat restoration efforts underway in the watershed. Improvements in instream flow have been made in recent years. An evaluation of feasibility of floodplain and estuary restoration in the lower river is currently underway. There have been significant efforts to improve substrate stability and quality. Several projects are reintroducing habitat complexity. Currently impaired habitat conditions in US Forest Service-managed areas in the upper watershed are expected to significantly improve with implementation of the Forest Plan. There are mainstem and tributary "islands" of high-quality habitat that warrant protection or have high restoration potential. With anticipated habitat restoration actions, future watershed potential to produce naturally spawning salmonids is considered to be good[12].

[11] *This table contains ratings for all salmonid stocks in the sub-region, as provided by the managers. For definitions of these ratings, see the* Components of This Report *section of the Introduction.*

[12] *Donald Haring, Washington Conservation Commission, March 19, 2001.*

HATCHERIES

Dungeness Hatchery

Dungeness Hatchery is located six miles southwest of Sequim on the Dungeness River. The total hatching capacity is approximately 7.5 million fry. Release capacity for the station is approximately two million fish, depending upon the size of the fish.

Hurd Creek Hatchery

Hurd Creek Hatchery is located approximately four miles north of Sequim on Hurd Creek, a Dungeness River tributary. It is operated as a satellite to the Dungeness Hatchery. It was originally built to support the Dungeness and Elwha hatcheries. In recent years, considerable capital investment has been made at Hurd Creek Hatchery specifically aimed at providing optimum stock recovery capacity. The 1997 brood year was the last year that naturally spawning-origin Dungeness chinook were brought into the facility. It is anticipated that by 2003, all but a small group of captive brood fish will have matured. [13]

[13] *Washington State Department of Fish and Wildlife Dungeness/Hurd Creek hatcheries staff.*

Dungeness Chinook

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	High	High	High
Population Viability	At Risk	At Risk	Healthy
Habitat	Limiting	Limiting	Healthy
Harvest Opportunity	None	Occasional	Most Years
Hatchery Program:			
Purpose	Conservation		
Type	Integrated		

PROGRAM DESCRIPTION

The Dungeness chinook stock was derived from pumping wild fish redds and seining of juveniles in the Dungeness River from 1992–97. This stock is maintained through a captive brood program at Hurd Creek Hatchery. Dungeness chinook salmon are one of two stocks in the Eastern Strait Chinook GDU. The purpose of this program is to conserve this biologically significant population of ESA-listed chinook. The resulting offspring are maintained in captivity to adulthood at the Hurd Creek Hatchery. Offspring from the captive-bred fish are incubated at Hurd Creek Hatchery and transferred to the Dungeness Hatchery until release as sub-yearling juvenile salmon. This program is being phased out. The current and future program size is limited to the 1,028 remaining captive broodstock (of 1995–97 brood year classes) currently on hand.

The present program includes releases into the Dungeness River of 200,000 sub-yearlings at 450 fish per pound (fpp) in May, 400,000 at 200 fpp in July and 775,000 at 80 fpp in August. Approximately 200,000–400,000 fish at 250 fpp and 80 fpp are released from an acclimation pond on the Gray Wolf River (upper Dungeness watershed). Additionally, 200,000 sub-yearlings at 450 fpp are released in May at various locations along the Gray Wolf River.

OPERATIONAL CONSIDERATIONS

- The annual average chinook spawner escapement estimate from 1986–99 is 147 adults, ranging from 45–335. Dungeness River chinook recruit-to-spawner ratio has been less than 1:1 in five years, greater than 1:1 in five other years, and 1:1 in one year.
- Release of Dungeness chinook as sub-yearlings presupposes that the predominant juvenile life history pattern of natural fish is less than one year of freshwater residence, and that out migration is as zero-age fish. Owing to low water temperatures at the Dungeness Hatchery, chinook do not attain the preferred release size of seven to ten grams until after the optimum release time in June, and are not released until late July or August.
- Natural sub-yearlings migrate seaward and reside in the lower river, and/or adjacent estuary, for an unknown period before leaving the Dungeness Delta area.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?

The short-term goals of maintaining the Dungeness chinook in protective custody, while maintaining genetic characteristics of the stock, in order to protect the stock from extinction, are likely being met. However, the program has not been successful to date in rebuilding runs and the stated goals for short- and long-term viability of naturally produced chinook in the system are a cause for concern. The offspring of the captive-bred Dungeness chinook, released as fry or small sub-yearling fish, will probably not exhibit survivals sufficient to attain conservation goals. The carrying capacity of the river and near-shore estuary appears to be unknown. This is of concern, considering the number and biomass of released sub-yearlings originating from the captive broodstock program and released from the Dungeness Hatchery.

B. Likelihood of attaining goals?

Chinook habitat in the mainstem Dungeness River is degraded due to diversion of instream flow for irrigation, loss of functional floodplain and estuary in the lower watershed, lack of habitat complexity, substrate instability, and poor riparian condition. This fair to poor habitat condition and the poor short-term outlook for improvement decreases the chances for recovery.

C. Consistent with goals for other stocks?

The program to conserve and enhance this stock appears to be consistent with the goals for other salmonid stocks in the Dungeness River Basin.

RECOMMENDATIONS

- Initiate a field study to describe the life history patterns of Dungeness chinook, including a description of juvenile and adult life history phases, and their distribution, abundance and migratory movements into, within and out of the river and estuary. A careful study in relation to habitat quality and type will be invaluable in determining the carrying capacity for chinook juveniles in the Dungeness River and for designing future hatchery-based recovery programs.
- Continue the restorative captive broodstock program with broodstock on hand. Size the hatchery program (adults used, smolts released) to match riverine carrying capacity. Discontinue zero age releases in July and August. Provide the capability to produce a mix of zero-age and yearling chinook.
- Develop an alternate recovery plan. Consider phase-in of a new hatchery program that does not involve captive broodstock, but continues the goal of maintaining genetic resources and reduces the risk of extinction.
- Seek new water source(s) to provide warmer rearing water than presently exists at the Dungeness Hatchery.
- Remove the intake barrier at Canyon Creek to allow passage of adult and juvenile chinook to historic spawning/rearing habitat. Open the side channel above and across the river from Canyon Creek and near the current Dungeness River intake at the Dungeness Hatchery, to provide important off-channel rearing habitat for chinook juveniles.
- Address long-term habitat improvement issues. The hatchery program will be successful only if the post-release environment is able to support the population.

COMMENTS

- Evidence for the existence of an alternate life history pattern was seen in studies conducted in 1996–97 (Jamestown S'Klallam Life History Study). Sampling of wild and captive broodstock offspring in this study began in June and was completed in October of 1996 and September of 1997. The authors concluded that the dominant life history pattern of out-migration was in the form of sub-yearling migrants that left the system or migrated to the lower river in the spring of their first year. Few yearling individuals were observed. However, yearlings do not typically out-migrate that late in the year and, if present, would have likely left the Dungeness system prior to commencement of the sampling program. Recent evidence gathered during snorkel surveys in the lower Elwha River indicate the presence of large, yearling chinook salmon residing in that river system as well. Yearling chinook smoltification and out-migration may not be a numerically important life history form in these two river systems, but may nevertheless constitute an important alternate life history form important to survival, and should be included in future fish culture programs.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG and has taken the following actions:

- Rearing strategy now targets the release of age-zero chinook prior to July.
- Test wells are being drilled to evaluate the opportunities to obtain warmer water and facilitate the removal of the intake barrier at Canyon Creek.
- Additional funding will be required to conduct studies to characterize the life history of this stock and identify habitat factors limiting stock productivity.

The Jamestown S'Klallam Tribe generally supports the recommendations of the HSRG (the Tribe's full comments are appended to this document). Many of the recommendations are consistent with those the co-managers have discussed for years.

- The study of freshwater life history patterns can be implemented in both the freshwater and marine environments, but we note that additional funding will be necessary to accomplish this task.
- Hatchery release strategies must be evaluated through analysis of coded wire tag recoveries. Evaluation of yearling release strategies will begin this year.
- Efforts to develop a recovery plan that moves the managers beyond the captive broodstock program will begin this year.
- Plans to develop well water sources for Dungeness hatchery are underway.
- Restoration of Canyon Creek can begin immediately if an alternate ground supply is secured by WDFW.
- Opening of the Dungeness side channel will be evaluated by experts in river hydrology.

Dungeness Hatchery Coho

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Intermediate	Intermediate	Intermediate
Population Viability[14]	Medium	Medium	Medium
Habitat	Limiting	Limiting	Limiting
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Dungeness Hatchery coho stock originated primarily from wild spawners in the Dungeness River, with a few introductions from the Elwha River. This stock has been maintained primarily from returnees to the Dungeness Hatchery since 1902. The goal of this program is to provide for harvest. Natural stock conservation is not currently a goal of the program. To this end, 500,000 coho yearlings are released from the Dungeness Hatchery each year. Eggs are collected and incubated on-station. Fish are reared and released on-station.

OPERATIONAL CONSIDERATIONS

- The operations of this program are consistent with guidelines for a segregated harvest program, particularly since conservation goals for the natural coho stock are considered secondary to meeting harvest goals in this watershed.
- The program has also taken reasonable steps to reduce potential ecological interactions with pink salmon by delaying release of hatchery coho during pink years.
- The program has recently reduced production from 800,000 yearlings to the current level of 500,000 yearlings, primarily because of concern about negative ecological interactions with depressed natural stocks in the basin.
- Because conservation goals are currently secondary to harvest goals, there is currently little or no monitoring of the natural coho populations in the Dungeness River.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?

This program is meeting regional harvest goals by providing a high level of terminal area fishing and contributing to pre-terminal harvest. The fishery supported by this program's production is currently the only significant fishery in Dungeness Bay and the Dungeness River. However, the goals stated for

[14] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

short- and long-term biological significance and viability of naturally produced coho in this system indicate that there is reason to be concerned about the effects of this program on the natural stock, including straying and ecological risks.

B. Likelihood of attaining goals?
If the goal is to maintain the natural population as a segregated population (that is, with the natural escapement goal of 500 fish being primarily natural origin recruits), strays from the hatchery program are likely to be inconsistent with that goal and in the long-term may result in a reduction in biological significance and population diversity.

C. Consistent with goals for other stocks?
Risks to other populations include predation risks to Dungeness chinook, summer and fall pink salmon, and risks from competition and genetic interactions with naturally produced coho stocks in the region. There are also potential risks from harvest activities directed at this stock on naturally produced coho originating from other independent Eastern Straits tributaries. Naturally spawning, hatchery origin coho may be posing significant risks to chinook and pink redds in the Dungeness River.

RECOMMENDATIONS

- Determine the status and define goals for the natural coho stock in the Dungeness River.
- Do not increase the size of the program above its current level because of the concern for negative ecological interactions with other important stocks within the basin.
- Evaluate whether the program could be modified into an integrated harvest program, incorporating natural origin recruits into the hatchery broodstock, to reduce the genetic risk from hatchery straying.
- Evaluate the effects of naturally spawning, hatchery-origin coho on the stability of chinook and pink salmon redds in the Dungeness River and modify the program to address this concern.

COMMENTS

None.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG, but notes that additional funding will be required to evaluate the status of the natural coho stock and the effects of naturally spawning, hatchery-origin coho on chinook and pink redds.

The Jamestown S'Klallam Tribe generally supports the recommendations and comments of the HSRG (the Tribe's full comments are appended to this document). Of particular importance is the recognition of the contribution of this program to the culture and economy of the Tribe.

- Evaluation of the status of the natural coho run and the interaction of smolt releases with natural stocks can be implemented in conjunction with the evaluation of life history strategies of Dungeness chinook. Additional funding will be necessary to accomplish this task.
- Efforts to assess the origin and distribution of coho spawners, and potential interactions with chinook and pink salmon spawning have begun.

- A better understanding of the current size and productivity of the natural coho stock as suggested in the HSRG's first recommendation is necessary to evaluate the possibility of successful incorporation of natural spawners into the hatchery broodstock.

Dungeness Fall Pink

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	High	High	High
Population Viability	Critical	Critical	At Risk
Habitat	Inadequate	Inadequate	Limiting
Harvest Opportunity	None	None	Occasional
Hatchery Program:			
Purpose	Conservation		
Type	Integrated		

PROGRAM DESCRIPTION

The Dungeness fall pink stock derives from, and is maintained by, wild adults trapped and genetically identified as fall (versus summer) in the Dungeness River. This program began in 1995. Dungeness fall pink salmon return in odd years and are the only stock within the Lower Dungeness GDU. The objective of this program is to conserve the fall pink stock (which has experienced significant declines) and to achieve this without genetic introgression from summer pinks (which use different sections of the river, but overlap somewhat in spawn timing). To this end, up to 1,200 adults are captured for spawning. Eggs are incubated at Hurd Creek and fry are released off-station.

OPERATIONAL CONSIDERATIONS

- Fall-run adults are collected via a weir or trap in the lower reach and transported to Hurd Creek Hatchery.
- All individuals are typed by DNA to ensure only fall run individuals are included. Individuals identified as summer run, or those with indistinguishable genotypes, are excluded.
- Incubation and rearing occurs in pathogen-free well water.
- Development and ponding times are manipulated to achieve the characteristics of the natural run.
- Individuals are transported to river mile 2.2 and released in May.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?

Habitat in the Lower Dungeness River is currently poor, due to diversion of instream flow and loss of floodplain. This is not expected to change in the short-term. The fall-run pink salmon population is highly significant, representing the only stock in the GDU. Its viability is at a critical level. Given the condition of the habitat, the program is consistent with the stated goals.

B. Likelihood of attaining goals?

Program risks to the fall-run pink salmon population include potential genetic divergence of the hatchery population from the naturally spawning population, decrease in effective population number,

and incorporation of summer-run genes into the fall-run gene pool. Procedures are available to minimize these risks (see Recommendations).

C. Consistent with goals for other stocks?
Potential risks to other stocks in the watershed include trapping mortality and handling stress to Dungeness chinook and summer-run pink salmon. Summer-run pink salmon may also experience delayed migration as a result of DNA testing.

RECOMMENDATIONS

- Conduct a risk assessment analysis of the hatchery operations to evaluate the demographic and genetic benefits and risks.
- Increase the probability of separating fall-run from summer-run individuals through improved genetic identification or other marking techniques.
- Minimize potential genetic divergence between the hatchery and naturally spawning population.
- Follow mating protocols that maximize effective population size.
- Consider acclimation procedures to improve imprinting and survival.
- Review procedures to ensure the security of the stock.
- Address long-term habitat improvement issues. The hatchery program will be successful only if the post-release environment is able to support the population.

COMMENTS

- DNA identification can correctly discriminate approximately 75% of individuals belong to the fall run. Therefore, the program will tend to amplify those genotypes that are the most divergent from the summer run, a form of directional selection. An increase in the number of markers to reduce the proportion of unidentifiable genotypes could improve the classification ability. Alternative types of external marks with improved coverage should also be investigated.
- Current program operations collect a large proportion of the total individuals belonging to the Lower Dungeness GDU. This places the unique gene pool at risk, should a catastrophic failure occur. Protocols and facilities should be reviewed to ensure sufficient redundancy and security.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG.

The Jamestown S'Klallam Tribe generally supports the recommendations and comments of the HSRG (the Tribe's full comments are appended to this document).

- A risk assessment analysis of the demographic and genetics risks and benefits of the hatchery program, including an assessment of the current habitat's ability to support this population, is appropriate.
- In 2001, analytical tools used for stock separation improved measurably. Different marking and tagging methods for cultured fish are currently being considered.

Dungeness Hatchery Winter Steelhead

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Intermediate	Intermediate	High
Population Viability[15]	Low	Low	Medium
Habitat	Limiting	Limiting	Healthy
Harvest Opportunity	Occasional	Occasional	Most Years
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Dungeness hatchery winter steelhead stock derives from Bogachiel Hatchery Chambers Creek (Puget Sound) stock. The program began in 1994. It is maintained through fish returning to the Dungeness Hatchery and through annual supplementation of fish or eggs from Bogachiel Hatchery. The objective of this program is to provide for harvest without impacting other stocks, including naturally spawning steelhead (if they exist), in the watershed. To this end, 10,000 winter steelhead juveniles returning to the Dungeness Hatchery are reared at Hurd Creek Hatchery and released from Dungeness Hatchery.

OPERATIONAL CONSIDERATIONS

- Low water temperatures at the Dungeness Hatchery inhibit the ability to culture steelhead to the desired size for release at the appropriate time.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
Program is consistent with the short-term goal of occasional harvest opportunity.

B. Likelihood of attaining goals?
Short-term harvest goals seem achievable; achieving long-term goals will depend upon implementation of the wild steelhead management zones plan described below.

C. Consistent with goals for other stocks?
Low release numbers pose negligible risk to other stocks. The HSRG has concerns about potential genetic interactions (outbreeding depression), predation and competition with other steelhead stocks, particularly naturally spawning stocks.

[15] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

RECOMMENDATIONS

- Implement Area-Wide Recommendations regarding establishing a regional system of wild steelhead management zones, where streams are not planted with hatchery fish and are instead managed for native stocks. Fishing for steelhead in these zones would not be incompatible with this approach, but no hatchery-produced steelhead should be introduced. Such zones would reduce the risk of naturally spawning fish interbreeding with hatchery fish, and provide native stocks for future fisheries programs.
- Select streams to represent a balance of large and small streams, productivity, etc. Hatchery production may need to be increased in streams selected for hatchery harvest. The HSRG encourages the use of locally-adapted stocks for those streams.
- Minimize interaction with naturally spawning steelhead when implementing a segregated steelhead program through such tools as differential timing and a decision on benefits versus risks on outplanting in freshwater habitat. In addition, adult collection procedures should be designed to capture as many adults from the returning segregated population as possible.
- Organize a workshop to develop this concept.
- Include monitoring and evaluation as a basic component of the concept, for both wild steelhead management zones and hatchery harvest streams.
- Release hatchery yearling steelhead smolts between May 1 and May 15, at a target size of six to the pound, and at a condition factor of less than 1.0.
- Remove intake barrier at Canyon Creek.
- Switch to well water, if possible, to address water temperature problems.

COMMENTS

None.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG, but notes the following:

- Implementing a regional system of wild steelhead management zones has a number of implications that will require discussion with the affected tribes and the Fish and Wildlife Commission.
- Test wells are being drilled to evaluate the opportunities to obtain warmer water and facilitate the removal of the intake barrier at Canyon Creek. Achieving the target release size and date for yearling steelhead smolts will be difficult until that water supply is available.

The Jamestown S'Klallam Tribe generally supports the recommendations and comments of the HSRG (the Tribe's full comments are appended to this document), but notes the following:

- Implementation of region-wide, wild steelhead management zones must be carefully evaluated based on biological factors and contribution to sustainable tribal fisheries.
- Regional differences in appropriate release sizes and times may exist that warrant analysis of available size and time release data.
- Dam removal and additional restoration of Canyon Creek likely represent some of the best tributary spawning habitat for steelhead, cutthroat, and coho.
- Plans to develop well water sources for Dungeness hatchery are underway. If this source of water becomes available, all aspects of incubation and initial rearing should be improved.

ELWHA

Overview

STOCK STATUS[16]

Stocks	Hatchery Program?	Biological Significance (L=Low, M =Intermediate, H =High)			Population Viability (L=Critical, M = At Risk, H = Healthy)			Habitat (L = Inadequate, M = Limiting, H = Healthy)			Harvest Opportunity (0 = None, L = Occasional, M = Most years, H = Each year)		
		Now	Goals		Now	Goals		Now	Goals		Now	Goals	
			Short-Term	Long-Term		Short-Term	Long-Term		Short-Term	Long-Term		Short-Term	Long-Term
Elwha Chinook	Y	H	H	H	M	M	H	L	M	H	0	0	M
Elwha Coho	Y	M	M	H	M	M	H	L	M	H	H	L	H
Elwha Pink	N	M	M	H	L	M	H	L	M	H	0	0	M
Elwha Chum	Y	M	M	H	L	M	H	L	M	H	0	0	M
Elwha Hatchery Winter Steelhead	Y	M	M	H	M	M	H	L	M	H	H	M	H
Elwha Summer Steelhead	N	L	?	?	L	?	?	L	M	H	L	L	?

HABITAT

Salmonid production in the Elwha River watershed is currently severely impaired due to the presence of the Elwha and Glines Canyon dams. Although habitat in the upper watershed is within the Olympic National Park and remains pristine, fish access is limited to only the lower 4.9 miles of what was historically a 77-mile range. Removal of the dam(s) has been authorized by Congress. Habitat condition downstream of Elwha Dam is poor (severely impaired) due to loss of suitable spawning substrate and loss of channel complexity. Some remaining floodplain side channels in the lower watershed have high-quality habitat. Potential to produce naturally spawning salmonids in the future is high, once the dams are removed and the associated habitat restoration matures. However, hatchery operations to maintain genetic integrity are imperative until habitat productivity is restored.[17]

HATCHERIES

Lower Elwha Hatchery

The coho program at the Lower Elwha Fish Hatchery began in 1978 using Elwha River broodstock. Facility water is a mix of surface and ground water. Water quality of the facility is similar to that found in the Elwha River. Groundwater is collected using two wells located on the facility. Fish enter the facility by means of an outfall creek constructed for the hatchery. Holding facilities consist of a three-quarter acre earthen pond divided into three sections: the trap, a section for females, and a section for males. Spawning facilities consist of two sheds. The program uses an incubation facility located on the hatchery grounds with a maximum instantaneous incubational capacity of 6.7 million

[16] *This table contains ratings for all salmonid stocks in the sub-region, as provided by the managers. For definitions of these ratings, see the* Components of This Report *section of the Introduction.*

[17] *Donald Haring, Washington Conservation Commission, March 19, 2001.*

eggs. The hatchery's rearing facility consists of 24 concrete raceways, eight fiberglass circular tanks, four asphalted rearing ponds and an earthen rearing pond. Fish are released directly from rearing ponds.[18]

Elwha Rearing Channel

The Elwha Rearing Channel was built in 1974 to maintain and enhance the run of fall chinook salmon indigenous to the Elwha River system. Since its inception, this facility has attained the goal of maintaining this stock and forestalling further decline in numbers. However, some factors limit the success of this facility. These include poor and limited natural habitat, pre-spawning adult mortality caused by the protozoan Dermocystidium (sp.), hatchery juvenile mortality as result of air bladder fungus (Phoma), and an inability to secure enough broodstock from the river (via trapping, netting and/or gaffing). In recent years, winter steelhead or coho salmon rearing has also taken place.

The Channel is located on the Elwha River, approximately seven miles west of Port Angeles, at river mile 2.9. The unscreened river intake is owned and operated by the city of Port Angeles. The Channel itself is 1400' x 50' and is divided into two sections by means of screens and stop logs. It was originally built as a spawning channel, but was never effective in that capacity, so it was modified into a rearing channel. A 125' x 50' adult trapping/holding area is located directly below the Channel outfall and is equipped with a 20' x 15' spawning shed. A 16½ stack incubation system covered by 28' x 21' canvas Quonset hut is available for incubation of eggs that cannot be transferred off-station.[19]

(Note: See descriptions of Dungeness and Hurd Creek hatcheries, which are involved in Elwha sub-regional programs, in the Dungeness Overview)

[18] *Larry Ward, Elwha Klallam Tribal staff, May 2001.*

[19] *Greg Travers, WDFW Hatchery Specialist, with edits by Darrell Mills, WDFW, April 27, 2001.*

Elwha Chinook

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	High	High	High
Population Viability	At Risk	At Risk	Healthy
Habitat	Inadequate	Limiting	Healthy
Harvest Opportunity	None	None	Most Years
Hatchery Program:			
Purpose	Conservation		
Type	Integrated		

PROGRAM DESCRIPTION

The Elwha chinook salmon stock derives from fish captured in the Elwha River during the 1920s, and has been supplemented with primarily Dungeness and Satsop (Chehalis basin) hatchery stocks. This stock is maintained through adults returning to the hatchery trap and through netting or gaffing adults on the spawning grounds. Elwha chinook salmon are one of two stocks in the Eastern Strait Chinook GDU. The primary purpose of this program is to maintain existing genetic resources in support of natural production in the basin, including the re-colonization of the upper watershed following dam removals. To this end, the program calls for the take of 4.3 million eggs (some adults are trapped at the Elwha Rearing Channel; most are collected in the Elwha River). Gametes are taken to the Hurd Creek Hatchery where they are eyed and then transferred to Soleduck Hatchery for hatching and early rearing. Final rearing occurs at the Elwha Rearing Channel. About 3.8 million sub-yearling smolts are released into the Elwha River.

OPERATIONAL CONSIDERATIONS

- Brood stock management (collection and holding) is particularly challenging in this basin.
- Current facilities require transfer of eggs and juveniles out of basin.
- Rearing conditions and protocols do not simulate those in the naturally spawning environment with respect to temperature, growth pattern, release size and age.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?

The use of a single, large-scale rearing and release strategy puts the short- and long-term conservation goals at some risk, especially in light of the poor smolt-to-adult survival. Transfers of eggs and juveniles are potentially costly to the health and fitness of the population.

B. Likelihood of attaining goals?
Recruits per spawner hovers around one, with no recent surplus for harvest. The likelihood of meeting short- and long-term goals would increase if the program were better tailored to the gene conservation and re-colonization objectives, with greater emphasis on quality and diversity.

C. Consistent with goals for other stocks?
The program is consistent with goals for other Elwha River stocks, as significant adverse effects on these stocks appear unlikely. Ecological interaction among stocks should be a consideration in the development of the Elwha Restoration Plan.

RECOMMENDATIONS

- Review the current program. A revised program may be more consistent with the conservation and re-colonization goals for the chinook stock. Maintain program size to provide an effective number of breeders of at least 500–1,000 adults per year. The program's primary focus should be on improved quality and diversity of smolts. Success should not be equated with the number of juveniles reared and released, but rather on achieving the necessary effective number of adult broodstock (the HSRG has drafted a white paper on the subject of smolt quality).
- Reduce or eliminate the need for transport of eggs and fry outside the watershed. This will require new or expanded facilities for incubation and early rearing.
- Mimic natural life history patterns of the stock using a combination of release strategies, including yearling releases, growth modulation and natural rearing.
- Ensure security of the stock through diverse rearing and release strategies and redundancy of facilities and systems.
- Develop an explicit schedule that takes into account both genetic and demographic risks as a function of spawner abundance, composition and population trends. This will benefit broodstock management.
- Address long-term habitat improvement issues. The hatchery program will be successful only if the post-release environment is able to support the population.

COMMENTS

- This program has succeeded in preserving the Elwha chinook stock over a long period of time, under challenging conditions.
- The review above is based on the current program. The HSRG is aware of current efforts to develop a plan for the recovery of chinook and other salmonids following the removal of two dams. The HSRG has provided informal comments on preliminary drafts of this plan. Specifically, the HSRG has suggested that this plan include contingencies for custody of the genetic resource under different environmental scenarios, including a schedule for disposition of returning adults as a function of run size. The HSRG has also urged the managers to consider the out-planting of adults into the upper watershed as a part of the recovery strategy. The plan should also emphasize the critical importance of monitoring and evaluation as a key component of a strategy for success. Additional consultation between the Elwha Recovery Team and the HSRG would likely be beneficial for development and refinement of the restoration and recovery plan.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG and notes the following:

- The Elwha Fish Restoration Team is evaluating options to ensure the security of the stock during removal of the dams and reintroduction of the stock into the upper watershed.
- Additional funding will be required to provide the facilities necessary to implement the recommendations.

The Elwha Tribe generally supports the recommendations of the HSRG and notes the following:

- The program will maintain a program size to provide greater than the recommended effective number of breeders of 500–1,000 adults per year. This approach will ensure stock maintenance and survival during dam removal.
- Recommendations to focus on smolt quality are consistent with our current effort to evaluate enhanced rearing environments for possible incorporation into restoration efforts.

Elwha Coho

Lower Elwha Klallam Tribe

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Intermediate	Intermediate	High
Population Viability	At Risk	At Risk	Healthy
Habitat	Inadequate	Limiting	Healthy
Harvest Opportunity	Each Year	Occasional	Each Year
Hatchery Program:			
Purpose	Harvest and Conservation		
Type	Integrated		

PROGRAM DESCRIPTION

The Elwha coho stock originated from wild stock in the Elwha River and has been supplemented with one-time introductions from the Satsop and Dungeness rivers. This stock is maintained through natural- and hatchery-origin fish that volunteer into the Lower Elwha Hatchery. Elwha coho belong to the Puget Sound/Strait of Georgia ESU. The goal of this program is the provision of harvest and simultaneous conservation of the stock for restoration of naturally spawning coho in the Elwha River after the dams are removed and habitat is restored. To this end, the program calls for the take of 1.2 million eggs from 1,250 returning adults and 250 wild spawners. All incubation and rearing occurs onsite at the Lower Elwha Hatchery. 750,000 smolts are released from the Lower Elwha Hatchery.

OPERATIONAL CONSIDERATIONS

- The program takes eggs from all parts of the run and culls down to an appropriate size.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The program has been self-sustaining, importing eggs only once in the past three decades. Performance has been consistent with the goal of annual harvest.

B. Likelihood of attaining goals?
The program is likely to succeed in maintaining a viable population of coho in the lower river and some annual harvest.

C. Consistent with goals for other stocks?
There is the potential for coho to prey on chum fry, but there are no data suggesting that this is occurring here. The program is otherwise consistent with goals for other Elwha River stocks, as significant adverse effects on other stocks appear unlikely. Ecological interaction among stocks should be a consideration in the development of the Elwha Restoration Plan.

RECOMMENDATIONS

- Continue and strengthen the use of natural rearing.
- Incorporate marking and tagging as a necessary tool for evaluation of program practices.
- Control and retard domestication in broodstock by purposeful incorporation of natural-origin returns in each generation.
- Estimate the proportion of hatchery-origin fish among the natural spawners.
- Address long-term habitat improvement issues. The hatchery program will be successful only if the post-release environment is able to support the population.

COMMENTS

- This is a good example of a natural rearing hatchery program.
- The review above is based on the current program. The HSRG is aware of current efforts to develop a plan for the recovery of salmonids following the removal of two dams. The HSRG has provided informal comments on preliminary drafts of this plan. Specifically, the HSRG has suggested that this plan include contingencies for custody of the genetic resource under different environmental scenarios, including a schedule for disposition of returning adults as a function of run size. The HSRG has also urged the managers to consider the out-planting of adults into the upper watershed as a part of the recovery strategy. The plan should also emphasize the critical importance of monitoring and evaluation as a key component of a strategy for success. Additional consultation between the Elwha Recovery Team and the HSRG would likely be beneficial for development and refinement of the restoration and recovery plan.

MANAGERS RESPONSE

The Elwha Tribe supports the recommendations of the HSRG to continue the use of natural rearing, incorporation of marking/tagging for program evaluation, incorporation of natural origin recruits into the hatchery broodstock, and monitoring the origin of natural spawners.

WDFW supports the recommendations of the HSRG.

Elwha Chum

Lower Elwha Klallam Tribe

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Intermediate	Intermediate	High
Population Viability	Critical	At Risk	Healthy
Habitat	Inadequate	Limiting	Healthy
Harvest Opportunity	No Harvest	No Harvest	Most Years
Hatchery Program:			
Purpose	Conservation		
Type	Integrated		

PROGRAM DESCRIPTION

The original Lower Elwha chum salmon program began in 1976 and continued through 1985, using broodstock from Walcott Slough in Hood Canal, Enetai Creek, Lyre River, and the Elwha River. Only eggs from the Elwha River were used after 1981. Based on genetic information, the early portion of the run appears to be closest to the native gene pool. The current program began in 1995 and is maintained by annually capturing wild fish from the Elwha River spawning grounds. Elwha River chum salmon belong to the Strait of Juan de Fuca fall-run GDU. There are five additional stocks in this GDU. The objective of the program is to conserve the existing Elwha River chum stock, which has been on the decline for years and is now chronically depressed. To this end, 75,000 eyed eggs are out-planted annually. The eggs are incubated to the eyed stage at the Lower Elwha Hatchery.

OPERATIONAL CONSIDERATIONS

- Though the early timed portion of the run is native, there is a history of introduced broodstock not native to the Elwha River.
- The use of Hood Canal stocks resulted in chum with a later run timing than that of native Elwha River chum.
- The program is experiencing difficulties in obtaining the needed number of adults.
- Outplants are not tagged or marked.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The program is consistent with the short- and long-term goals for the stock. However, a small effective population size constitutes a potential genetic risk.

B. Likelihood of attaining goals?
There is a reasonable likelihood of attaining the program's goals, particularly if harvest is held to zero currently and in the near-term (as planned), and if habitat improves to "healthy" in the long-term (as anticipated).

C. Consistent with goals for other stocks?
The program is consistent with goals for other Elwha River stocks, as significant adverse effects on other stocks appear unlikely.

RECOMMENDATIONS

- Develop and implement a plan to increase effective broodstock size.
- Focus broodstock collections on the early part of the run, to produce a run timing more akin to that of the original Elwha stock. If necessary, use another Strait of Juan de Fuca chum source, should the present early Elwha chum run prove unable to meet program needs.
- Outplant not only eyed eggs, but also fry that have been hatchery-reared to about one gram in size.
- Time fry outplants to avoid predation from coho, chinook and steelhead in the Elwha River.
- Use some form of marking, so that success of the program and its release strategies can be evaluated.
- Address long-term habitat improvement issues. The hatchery program will be successful only if the post-release environment is able to support the population.

COMMENTS

- Fry releases are likely to increase the program's chances of success.
- Take precautions to minimize the likelihood of introducing exotic pathogens with any chum stock used for satisfying the second recommendation, above.
- The review above is based on the current program. The HSRG is aware of current efforts to develop a plan for the recovery of salmonids following the removal of two dams. The HSRG has provided informal comments on preliminary drafts of this plan. Specifically, the HSRG has suggested that this plan include contingencies for custody of the genetic resource under different environmental scenarios, including a schedule for disposition of returning adults as a function of run size. The HSRG has also urged the managers to consider the out-planting of adults into the upper watershed as a part of the recovery strategy. The plan should also emphasize the critical importance of monitoring and evaluation as a key component of a strategy for success. Additional consultation between the Elwha Recovery Team and the HSRG would likely be beneficial for development and refinement of the restoration and recovery plan.

MANAGERS RESPONSE

The Elwha Tribe generally agrees with the recommendations of the HSRG and notes the following:
- Broodstock collection currently targets the early portion of the return timing as recommended by the HSRG.
- The Elwha Fish Restoration Team will evaluate the use of fry outplants in addition to the current eyed egg plants.
- Marking will be incorporated into the evaluation of the chum program if resources are available for implementation.

WDFW supports the recommendations of the HSRG.

Elwha Hatchery Winter Steelhead

Lower Elwha Klallam Tribe

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Intermediate	Intermediate	High
Population Viability[20]	Medium	Medium	High
Habitat	Inadequate	Limiting	Healthy
Harvest Opportunity	Each Year	Most Years	Each Year
Hatchery Program:			
Purpose	Harvest and Conservation		
Type	Segregated		

PROGRAM DESCRIPTION

The Elwha hatchery winter steelhead stock derives from a variety of sources, with the primary stocks being Chambers and Bogachiel (Puget Sound derivatives). This program has been maintained with adult returns to the Lower Elwha Hatchery since 1977. The objective of the program is to provide for harvest, while conserving winter steelhead in the Elwha River. To this end, 120,000 smolts are reared annually for release into the Elwha River.

OPERATIONAL CONSIDERATIONS

None.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
This segregated program is consistent with short- and long-term harvest goals. Use of this early running, non-native broodstock is not consistent with the long-term conservation goals.

B. Likelihood of attaining goals?
The current program is likely to attain harvest goals but not conservation goals.

C. Consistent with goals for other stocks?
The relatively large number of smolt releases of a segregated hatchery stock will pose significant risk to a native population that may be residualized above dams and used as a possible core for recolonization. Large out-plants of smolts are likely to pose a risk of predation on other salmonids in the watershed.

[20] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

RECOMMENDATIONS

- Implement Area-Wide Recommendations for establishing a regional system of "wild steelhead management zones," consistent with the Elwha Restoration Plan, where streams are not planted with hatchery fish and are instead managed for native stocks. Fishing for steelhead in these zones would not be incompatible with this approach, but no hatchery-produced steelhead should be introduced. Such zones would reduce the risk of naturally spawning fish interbreeding with hatchery fish, and provide native stocks for future fisheries programs.
- Select streams to represent a balance of large and small streams, productivity, etc. Hatchery production may need to be increased in streams selected for hatchery harvest. The HSRG encourages the use of locally-adapted stocks for those streams.
- Minimize interaction with naturally spawning steelhead when implementing a segregated steelhead program through such tools as differential timing and a decision on benefits versus risks on outplanting in freshwater habitat. In addition, adult collection procedures should be designed to capture as many adults from the returning segregated population as possible.
- Organize a workshop to develop this concept.
- Include monitoring and evaluation as a basic component of the concept, for both wild steelhead management zones and hatchery harvest streams.
- If a conservation program is desired, it will need to be considered separately, using a more appropriate broodstock.
- Release hatchery yearling steelhead smolts between May 1 and May 15, at a target size of six to the pound, and at a condition factor of less than 1.0.

COMMENTS

- The HSRG believes this is an inappropriate stock for recolonization of the upper watershed.
- The review above is based on the current program. The HSRG is aware of current efforts to develop a plan for the recovery of salmonids following the removal of two dams. The HSRG has provided informal comments on preliminary drafts of this plan. Specifically, the HSRG has suggested that this plan include contingencies for custody of the genetic resource under different environmental scenarios, including a schedule for disposition of returning adults as a function of run size. The HSRG has also urged the managers to consider the out-planting of adults into the upper watershed as a part of the recovery strategy. The plan should also emphasize the critical importance of monitoring and evaluation as a key component of a strategy for success. Additional consultation between the Elwha Recovery Team and the HSRG would likely be beneficial for development and refinement of the restoration and recovery plan.

MANAGERS RESPONSE

The Elwha Tribe generally agrees with the recommendations of the HSRG and notes the following:

- The Wild Steelhead Management zones are a good concept. This is currently implemented to some degree in the Strait region.
- Alternate broodstock sources are being considered for use in the Elwha Restoration Plan.
- Additional consultation has occurred between the Elwha Fisheries Technical Group and the HSRG. Further consultation would be beneficial to the planning process.

WDFW supports the recommendations of the HSRG.

SMALLER WATERSHEDS

Overview

STOCK STATUS[21]

Stocks	Hatchery Program?	Biological Significance (L= Low, M = Intermediate, H = High)			Population Viability (L= Critical, M = At Risk, H = Healthy)			Habitat (L = Inadequate, M = Limiting, H = Healthy)			Harvest Opportunity (0 = None, L = Occasional, M = Most years, H = Each year)		
		Now	Goals		Now	Goals		Now	Goals		Now	Goals	
			Short-Term	Long-Term		Short-Term	Long-Term		Short-Term	Long-Term		Short-Term	Long-Term
Smaller Watersheds Summer Chum	Y	H	H	H	L	L	M	L	L	M	0	0	L
Smaller Watersheds Win. Steelhead	Y	M	M	M	L	L	M	M	M	M	M	M	M
Snow Creek Coho	Y	M	M	M	L	L	M	L	L	M	0	0	L
Smaller Watersheds Other Coho	Y	L	L	L	L	L	L	M	M	M	0	0	0

HABITAT

The major tributaries to Discovery Bay are Snow and Salmon Creeks. Minor tributaries include Contractors Creek and Eagle Creek. Minor tributaries to Sequim Bay include Jimmycomelately Creek, Johnson Creek, and Chicken Coop Creek. Habitat in the largest of these tributaries, Jimmycomelately Creek as currently poor, with severe channel confinement, lack of floodplain connectivity, and loss of estuarine function. Habitat conditions in the Morse Creek watershed are currently poor. Morse Creek has a small population of summer chum. Chinook are likely extirpated in the creek. Ennis Creek is the smallest of the snow-fed streams on the north Olympic Peninsula. Although considered to be the healthiest of the Port Angeles urban streams, overall habitat condition would probably be considered to be only fair. Bell Creek drains a rapidly urbanizing area in Sequim. Habitat conditions are generally poor, except where habitat has been restored. Gierin Creek habitat conditions are generally fair to good, due in large part to the management of a large wetland area in the lower watershed (Graysmarsh) for the benefit of fish and wildlife. Casselery and Cooper Creeks offer limited salmonid production potential. Each of the creek systems has a significant wetland upstream of the mouth, although these wetland areas may have been naturally isolated from saltwater by presence of a natural sandbar.

Habitat conditions are generally poor in Port Angeles urban streams (Lees Creek, Peabody Creek, Valley Creek, Tumwater Creek, Dry Creek). The larger watersheds that drain into the Strait of Juan de Fuca, bounded by Colville Creek to the east and the mouth of the Strait of Juan de Fuca to the west, include the Hoko, Seiku, Pysht, Clallam, and Lyre Rivers. Fall chinook salmon were historically abundant throughout many of the larger watersheds, but currently, the only large population spawns in the Hoko River, and that stock is considered to be "depressed." Small numbers are sometimes recorded in the Lyre River, Seiku River, and the Pysht River. Historically, chinook were also noted in the Clallam River, Salt Creek, Bullman Creek, Sail River, and Deep Creek, but this

[21] *This table contains ratings for all salmonid stocks in the sub-region, as provided by the managers. For definitions of these ratings, see the* Components of This Report *section of the Introduction.*

species has not been documented in these streams for several years. Chum salmon have been documented in the Sail River, Bullman Creek, Seiku River, Hoko River, Clallam River, Pysht River, Deep Creek, Twin Rivers, Lyre River, and Salt Creek. However in recent years, chum salmon have not been noted in Salt Creek, and the levels in Deep Creek have sharply declined. Coho salmon and winter steelhead trout are distributed throughout all of the drainages discussed below, with steep declines for both species in Deep Creek. Small numbers of pink salmon have been seen in the Lyre River.[22]

HATCHERIES

No hatchery facilities are located within this sub-region.

[22] *Donald Haring, Washington Conservation Commission, March 19, 2001*.

Smaller Watersheds Summer Chum

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	High	High	High
Population Viability	Critical	Critical	At Risk
Habitat	Inadequate	Inadequate	Limiting
Harvest Opportunity	None	None	Occasional
Hatchery Program:			
Purpose	Conservation		
Type	Integrated		

PROGRAM DESCRIPTION

The Smaller Watersheds summer chum stock derives from Salmon and Jimmycomelately creeks and is maintained through yearly collection of green eggs from these creeks. The eggs are placed in remote site incubators (RSI). Salmon and Jimmycomelately are the only stocks in the Strait of Juan de Fuca Summer Chum GDU. The purpose of this program is summer chum salmon restoration. To this end, 200,000 green eggs are taken at Salmon Creek and eyed at Dungeness Hatchery. The planting goal is 80,000 fish between 350–650 fish per pound released into Chimicum Creek and 91,000 fish between 350-650 fish per pound into Discovery Bay. 90,000 green eggs are taken at Jimmycomelately Creek, incubated and ponded at Hurd Creek Hatchery and at Jimmycomelately. The planting goal is 86,000 fish at 450 fish per pound into Jimmycomelately Creek.

OPERATIONAL CONSIDERATIONS

- The summer chum salmon restoration programs include Salmon, Jimmycomelately, and Chimacum Creeks in the regional management goals. The program follows the guidelines of the Summer Chum Conservation Initiative[23], the goal of which is to restore healthy, natural self-sustaining, summer chum salmon populations.
- Conservation goals either maintain genetic characteristics of native stocks (i.e., Salmon, Jimmycomelately creeks), or will develop locally adapted broodstocks (initially using brood stock from the Salmon Creek project for Chimacum Creek).
- All programs recognize future options, with up to 12 years of an "integrated recovery" supplementation program. Directed harvests may occur after full recovery.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The program is consistent with short- and long-term goals.

[23] *Summer Chum Conservation Initiative, Washington State Department of Fish and Wildlife and Point No Point Treaty Tribes, April 2000.*

B. Likelihood of attaining goals?
The program, if executed correctly, is likely to achieve its goals.

C. Consistent with goals for other stocks?
Restoring chum would be consistent with goals for other stocks.

RECOMMENDATIONS

- Continue to conduct this program consistent with the Summer Chum Conservation Initiative.
- Address long-term habitat improvement issues. The hatchery program will be successful only if the post-release environment is able to support the population.

COMMENTS

- The conservation goals, harvest objectives, and social and cultural objectives are realistic and well thought out.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG. The summer chum restoration programs are an example of the carefully designed and successfully implemented programs that WDFW believes can play an important role in the restoration of salmonid populations. Funding to undertake this program was provided under a special appropriation from the Washington Legislature.

Smaller Watersheds Hatchery Winter Steelhead

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Intermediate	Intermediate	Intermediate
Population Viability[24]	Low	Low	Medium
Habitat	Limiting	Limiting	Limiting
Harvest Opportunity	Most Years	Most Years	Most Years
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Smaller Watersheds hatchery winter steelhead program relies on annual outplants from Bogachiel Hatchery. The stock originates from Chamber Creek. The purpose of the program is to provide for harvest, while avoiding adverse interactions with naturally spawning stocks. To this end, smolts are planted into the Lyre River (25,000), Pysht River (10,000) and Morse Creek (5,000).

OPERATIONAL CONSIDERATIONS

- Fish are incubated and reared at Bogachiel (a hatchery in a region not yet reviewed by the HSRG), so operations have not yet been evaluated.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The program is consistent with the short-term goal of occasional harvest opportunity.

B. Likelihood of attaining goals?
Short-term harvest goals seem achievable; achieving long-term goals will depend upon implementation of the wild steelhead management zones plan described below.

C. Consistent with goals for other stocks?
Low levels of spawning overlap between a segregated, early winter steelhead hatchery stock and late winter native stock may pose increasing risk over the long-term that could compromise the native stock. There may also be some predation risk to naturally produced chum.

[24] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

RECOMMENDATIONS

- Implement Area-Wide Recommendations regarding establishing a regional system of "wild steelhead management zones" where streams are not planted with hatchery fish and are instead managed for native stocks. Fishing for steelhead in these zones would not be incompatible with this approach, but no hatchery-produced steelhead should be introduced. Such zones would reduce the risk of naturally spawning fish interbreeding with hatchery fish, and provide native stocks for future fisheries programs.
- Select streams to represent a balance of large and small streams, productivity, etc. Hatchery production may need to be increased in streams selected for hatchery harvest. The HSRG encourages the use of locally-adapted stocks for those streams.
- Minimize interaction with naturally spawning steelhead when implementing a segregated steelhead program through such tools as differential timing and a decision on benefits versus risks on outplanting in freshwater habitat. In addition, adult collection procedures should be designed to capture as many adults from the returning segregated population as possible.
- Organize a workshop to develop this concept.
- Include monitoring and evaluation as a basic component of the concept, for both wild steelhead management zones and hatchery harvest streams.
- Release hatchery yearling steelhead smolts between May 1 and May 15, at a target size of six to the pound, and at a condition factor of less than 1.0.

COMMENTS

None.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG, but notes that implementing a regional system of wild steelhead management zones has a number of implications that will require discussion with the affected tribes and the Fish and Wildlife Commission.

Snow Creek Coho

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Intermediate	Intermediate	Intermediate
Population Viability	Critical	Critical	At Risk
Habitat	Inadequate	Inadequate	Limiting
Harvest Opportunity	None	None	Occasional
Hatchery Program:			
Purpose	Conservation		
Type	Integrated		

PROGRAM DESCRIPTION

The Snow Creek coho stock program at Hurd Creek Hatchery derives from and is maintained through returns to Snow Creek. This stock belongs to the Puget Sound/Strait of Georgia ESU. The objective of the program is to restore a healthy, natural, self-sustaining coho salmon population in Snow Creek. To this end, eggs from coho adults returning to Snow Creek are collected and outplanted in the watershed in remote satellite incubators, or are hatched and the resulting progeny hatchery-reared for release into the watershed at two different ages.

OPERATIONAL CONSIDERATIONS

- The program will be comprised of supplemented and naturally spawning fish, using Snow Creek natural-origin brood stock.
- The Snow Creek program also supports public education on salmon, and ceremonial and subsistence harvest in Discovery Bay.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
B. Likelihood of attaining goals?
C. Consistent with goals for other stocks?

The program is consistent with short- and long-term goals and is likely to achieve these goals. There is some risk of predation on natural stocks, including chum.

RECOMMENDATIONS

- Continue conducting the program as designed.
- Address long-term habitat improvement issues. The hatchery program will be successful only if the post-release environment is able to support the population.

COMMENTS

- The conservation goals, harvest considerations, and educational objectives are realistic and well thought out. It is apparent that much productive effort has been put into program design, and collecting and analyzing data.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG. The Snow Creek coho project is an example of the carefully designed and successfully implemented programs that WDFW believes can play an important role in the restoration of salmonid populations. While the project is an important tool for restoring coho salmon in Snow Creek, it could potentially play an even more important role in developing improved strategies for restoring depressed populations of coho salmon throughout the state. However, it is critically important that the HSRG maintain funding for this project, to assure that these goals are achieved.

Smaller Watersheds Other Hatchery Coho

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability	Low	Low	Low
Habitat	Limiting	Limiting	Limiting
Harvest Opportunity	None	None	None
Hatchery Program:			
Purpose	Education		
Type	Segregated		

PROGRAM DESCRIPTION

The Smaller Watersheds other hatchery coho program is used for an education project (eggs in the classroom) and rehabilitation for a local creek (Cooper Creek). This program relies on annual outplants from Hurd Creek Hatchery. The stock originates from the Dungeness River. The purpose of this program is education. To this end, 6,750 Dungeness River fry are provided from Hurd Creek Hatchery, reared in ten elementary and high school classroom aquaria, and released into Bell, Ennis, Matriotti, Tumwater and Valley creeks.

OPERATIONAL CONSIDERATIONS

None.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
B. Likelihood of attaining goals?
C. Consistent with goals for other stocks?

This program provides a valuable educational benefit. It is too small to produce significant risks.

RECOMMENDATIONS

- Continue these education programs.

COMMENTS

- These programs are using appropriate fish stocks.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG to continue education programs. These programs are an essential component of our efforts to spark public interest, education, and participation in salmon recovery.

❖South Sound

Overview

This region includes the portion of Puget Sound south of the Tacoma Narrows. For the purposes of this review, the Scientific Group and the regional managers divided the region into five sub-regions and then reviewed the hatchery programs involving each identified sub-regional salmonid stock (for example, Chambers Basin fall chinook). The review included a consideration of the program's effects on all other hatchery and naturally spawning sub-regional salmonid stocks (see table in sub-regional overviews). The sub-regions identified for this region include:

1. Chambers Creek Basin (Fort Lewis and north)
2. Nisqually River and Delta
3. Deschutes River
4. Squaxin/South Sound Net Pens and Independent Tributaries
5. Key Peninsula (including Fox Island Net Pens)

This chapter provides region-wide recommendations for the South Sound, a general overview of each sub-region, followed by reviews and recommendations for each salmonid stock that has an associated hatchery program.

FISHERIES

Since 1977, South Sound salmon management has been directed by the Puget Sound Salmon Management Plan. Under that plan, South Sound chinook and coho stocks have been harvested at rates appropriate for hatchery stocks, with natural escapements being a secondary consideration. Unless there were specific accommodations made to protect natural stocks (e.g. Deschutes coho), natural escapements have been the result of whatever natural fish escaped fisheries designed to fully harvest the available hatchery stocks.[25]

CONSERVATION

Effort levels devoted to stock assessment of South Sound salmon stocks have been prioritized by the harvest management strategy outlined for this region by the Puget Sound Salmon Management Plan and other efforts pursued by the co-managers to increase understanding of salmon in the region. Emphasis has been given to species and stocks that have been managed for natural escapement goals (winter chum, fall chum, summer chum, pinks and winter steelhead). Conversely, natural stocks of species managed at a hatchery harvest rate in this region (coho and chinook) have been generally sampled at a lower rate than stocks of the same species in a region that managed them for natural escapement. The Comprehensive Coho planning process is providing a forum for discussion by the co-managers regarding means by which protection can be afforded South Sound coho natural stocks throughout the gauntlet of terminal and pre-terminal fisheries.[26]

[25] *Chuck Baranski, Washington State Department of Fish and Wildlife July 2001.*

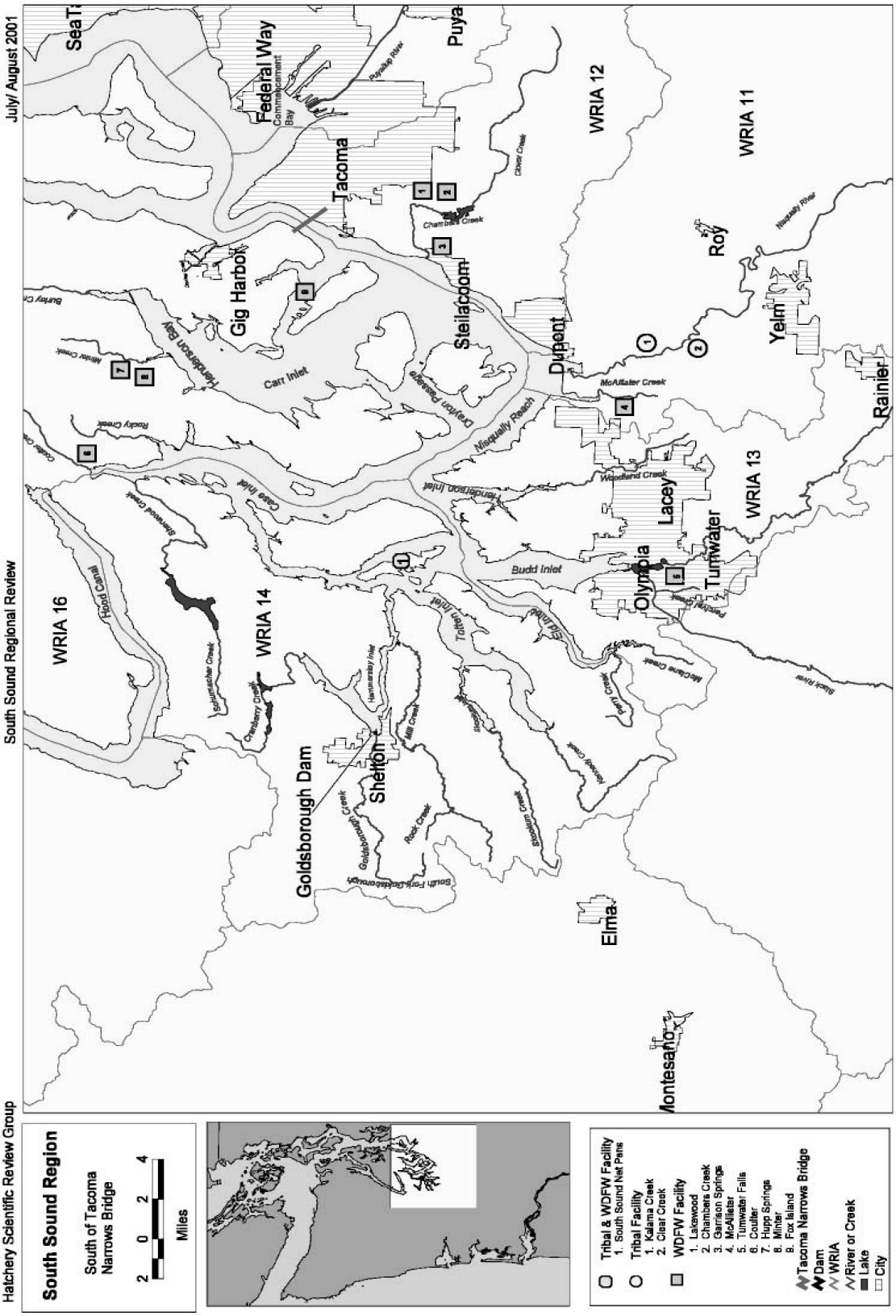
[26] *Ibid*

HABITAT

South Puget Sound future fish habitat expectations are directly correlated to the effects of human population growth and development, and aquatic and land use regulations intended to mitigate their adverse effects. Growth-planning projections indicate continued growth expansion in the South Sound region. Major employers, state government and federal military, are relatively stable. Other businesses and industries are diversified. The Growth Management Act (GMA) and Shoreline Management Act (SMA) have required local governments to provide improved aquatic area protection, including increased aquatic buffers. Instream flows are expected to be minimally affected by development water use and only in selected sub-watersheds, because of generally good watershed hydrographs. Storm water, development sedimentation, and beach and stream bank channelization impacts are expected to still be significant in the future, although improved local regulations, facility upgrades, and Best Management Practices (BMPs) should lessen, but not prevent, such impacts. The cumulative consequences of the projected population and development expansion are expected to have some degree of negative effect on aquatic fish habitats. Nonetheless, the long-term goal for South Sound is for healthy, protected habitat for fish and wildlife.

The most notable South Sound watershed-scale restoration effort is on the Nisqually River main stem, where the Nisqually Tribe and the Nisqually Land Trust are purchasing sensitive floodplain and estuarine land and using conservation easements to retain estuarine and riparian habitat. Other stream restoration efforts exist for South Puget Sound watersheds, although most are only selected reach-scale restoration efforts, such as the Goldsborough Dam Removal and Stream Restoration Project, Kennedy Creek watershed planning, Woodland Creek watershed planning, and the Capitol Lake and Dam Fish Passage and Estuary Review. Numerous small projects (primarily fish passage corrections) are being conducted by a variety of local governments, county conservation districts, and regional fish enhancement groups with technical assistance from WDFW. These projects are not long-term, with dedicated funds. Most are supported by the Salmon Recovery Funding Board (SRFB).[27]

[27] *Jim Frasier, Washington State Department of Fish and Wildlife, July 2001.*


July/ August 2001
South Sound Regional Review
Hatchery Scientific Review Group
South Sound Region
South of Tacoma Narrows Bridge
2 0 2 4
Miles
WRIA 16
WRIA 14
WRIA 12
WRIA 11
WRIA 13
Federal Way
Tacoma
Gig Harbor
Steilacoom
Puya
Roy
Yelm
Dupont
Rainier
Lacey
Olympia
Tumwater
Shelton
Goldsborough Dam
Elma
Montesano
Hood Canal
Case Inlet
Carr Inlet
Budd Inlet
Henderson Bay
Dalco Passage
Commencement Bay
Chambers Creek
Clover Creek
McAllister Creek
Woodland Creek
Percival Creek
Deschutes River
Black River
Tribal & WDFW Facility
1. South Sound Net Pens
Tribal Facility
1. Kalama Creek
2. Clear Creek
WDFW Facility
1. Lakewood
2. Chambers Creek
3. Garrison Springs
4. McAllister
5. Tumwater Falls
6. Coulter
7. Hupp Springs
8. Minter
8. Fox Island
Tacoma Narrows Bridge
Dam
WRIA
River or Creek
Lake
City

CHAMBERS CREEK BASIN

Overview

STOCK STATUS[28]

Stocks	Hatchery Program?	Biological Significance (L= Low, M = Intermediate, H = High)			Population Viability (L= Critical, M = At Risk, H = Healthy)			Habitat (L = Inadequate, M = Limiting, H = Healthy)			Harvest Opportunity (0 = None, L = Occasional, M = Most years, H = Each year)		
		Now	Goals		Now	Goals		Now	Goals		Now	Goals	
			Short-Term	Long-Term		Short-Term	Long-Term		Short-Term	Long-Term		Short-Term	Long-Term
Chambers Basin Hatchery Fall Chinook	Y	L	L	L	L	L	L	L	L	L	H	H	H
Chambers Basin Coho	N	L	M	M	L	L	M	L	M	M	L	L	M
Garrison Springs Chum	Y	H	H	H	M	M	H	L	L	M	0	0	L
Chambers Basin Steelhead	N	L	L	L/M	L	L	M	L	M	M	0	0	0

HABITAT

Although Chambers Creek still has some good habitat in the lower end, it suffers from water quality problems, including high copper levels resulting from ongoing algae control efforts in Steilacoom Lake. Some excellent spawning and rearing habitat exists in the upper end but passage problems preclude access to it by anadromous fish in most years. Some of the blockages are scheduled to be modified to allow passage. WDFW transports several hundred adult coho salmon above the blockages each fall.[29]

This watershed currently supports runs of winter chum, coho, coastal cutthroat and winter steelhead trout. Salmonid habitat conditions in the mainstem Chambers and Clover Creeks can be described as fair to poor in the lower reaches and as fair with increasing pressure from urbanization in the upper reaches.

The major habitat concerns associated with the mainstem Chambers-Clover Creek and tributaries include: 1) the tidal headwater dam where historically all migrating anadromous adults were handled prior to either being incorporated into a hatchery broodstock or released upstream; 2) the loss of functional floodplain due to extensive channel relocations, channelization, and tight-lining (pipes); 3) the alteration to stream hydrology due to high levels of impervious surfaces; 4) a lack of properly functioning riparian habitats; 5) impacts to smoltification through the application of pesticides and in particular the herbicides used to treat algae in Steilacoom Lake; and 6) the loss of portions of estuary habitats caused by the dam at the head of Chambers Bay.[30]

[28] *This table contains ratings for all salmonid stocks in the sub-region, as provided by the managers. For definitions of these ratings, see the* Components of This Report *section of the Introduction.*

[29] *Conservation Priorities: An Assessment of Freshwater Habitat For Puget Sound Salmon, The Trust For Public Land, Seattle, WA, November 2000.*

[30] *John Kerwin, Washington Conservation Commission, July 2001.*

HATCHERIES

Lakewood Hatchery

The Lakewood Hatchery (formerly the South Tacoma Hatchery) is located on Chambers Creek in South Puget Sound, adjacent to the South Puget Sound Wildlife Area approximately 500 yards from Chambers Creek at river mile 3.3. The Lakewood Hatchery is part of the South Sound Hatchery Complex which includes Garrison Springs Hatchery, Chambers Creek Hatchery, and the Chambers Creek Adult Trap; all in the Chambers Creek Basin. Until 1997, Lakewood Hatchery (and the other facilities in this complex) provided significant support for winter-run and summer-run steelhead and catchable rainbow trout programs throughout western Washington. In 1997, fish management decisions to develop locally-adapted steelhead broodstocks and to substantially cut catchable trout production reduced the need for support from these facilities. Today, Lakewood Hatchery produces 200,000 yearling fall chinook, maintains a small rainbow trout broodstock population, and provides support for other trout programs in the region.

Chambers Creek Hatchery

The Chambers Hatchery is located on Chambers Creek in South Puget Sound. The primary goal of the current hatchery program is to provide chinook salmon for recreational harvest in the Puget Sound (released as yearlings). Today, Chambers produces 100,000 yearling fall chinook, 200,000 cutthroat fry and more than 400,000 kokanee. The hatchery was originally a private trout hatchery. It was purchased by the Game Department in the late 1960s and was rebuilt in the late 1970s. It was opened as a Game Department facility in 1976.

Garrison Springs Hatchery

Garrison Springs Hatchery is located in a canyon between Western State Hospital and the Abitibi Paper Mill. There is no migratory outlet from the hatchery, as the water passes several man-made cascades and a portion enters the paper mill. Garrison Creek enters the tidewater in Chambers Bay approximately one quarter mile below the Chambers Creek Trap. All fish reared at Garrison Springs Hatchery are shipped out on planting trucks. Garrison Springs Hatchery is currently programmed to release 850,000 sub-yearling chinook at 50 fish per pound into Chambers Creek. This program has been in existence for about 20 years. Garrison Springs Hatchery also supports other facilities by incubating eggs and rearing fish during the summer.

The Chambers Creek trap is at river mile 0.4 on Chambers Creek and is at the terminal limit of tidal influence, the Chambers Creek Dam. A satellite to Garrison Creek Hatchery, the Chambers Trap is located at tidewater near the Abitibi Paper Mill and the Pierce County Waste Treatment Facility. This facility provides the backbone for hatchery chinook production in Chambers Creek. The main uses of the Chambers Trap are to collect broodstock for salmon programs in the basin, enumerate and pass other species of naturally spawning salmon and trout upstream, and to acclimate chinook fingerlings prior to release into Chambers Creek.[31]

[31] *Rich Eltrich, Washington State Department of Fish and Wildlife, July 2001.*

Chambers Basin Hatchery Fall Chinook

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[32]	Low	Low	Low
Habitat	Inadequate	Inadequate	Inadequate
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Chambers Creek Basin hatchery fall chinook program began in the 1980s with fish of Green River origin from Deschutes, Soos and Puyallup hatcheries. This stock is maintained through adult returns to the Chambers Creek trap, but can be supplemented with Minter Creek and Deschutes stock. The purpose of this program is to provide for harvest. To this end, 300,000 yearlings (200,000 at Lakewood Hatchery, 100,000 at Chambers Creek Hatchery) and 850,000 fingerlings (600,000 at Chambers Creek trap, 250,000 at Steilacoom Lake) are released into the Chambers Creek drainage. Yearling production is eyed and hatched at Chambers Creek Hatchery and reared at both Chambers Creek and Lakewood hatcheries. Fingerling production is eyed, hatched and reared at Garrison Springs Hatchery.

OPERATIONAL CONSIDERATIONS

- The operations of this program are generally consistent with guidelines for a segregated harvest program.
- Evaluation of the contribution of the yearling program was not possible because the program is relatively new, with minimal tagging to date.
- Use of circular ponds previously used in the trout program and seasonal water quality problems were identified as contributing to infections of furunculosis and parasites, both of which require regular drug treatments to control.
- The size of the current yearling program is too large for the existing facilities, requiring excessive transfer between stations to maintain the program level.

[32] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The program currently provides significant benefits to the terminal area treaty and recreational fishery from its fingerling component. This program is not only consistent, but necessary to attain, the short-term and long-term harvest goals for the basin, since natural production potential for fall chinook in this basin is severely limited by habitat quantity and quality. Since the yearling component of this program is relatively new, it was not possible to evaluate its contribution to he harvest goals for this stock.

B. Likelihood of attaining goals?
The likelihood of attaining the goals is dependent on improving rearing conditions at the facilities, evaluation of the release strategies employed, and implementation of the most successful strategy or strategies.

C. Consistent with goals for other stocks?
Risks to other populations include competition risks to other South Sound chinook stocks, including those in the Nisqually, Deschutes and Key Peninsula basins. A general concern exists across all species regarding the current South Sound carrying capacity. There are also potential predation risks to natural chum salmon stocks from the region, particularly from the yearling component of the program.

RECOMMENDATIONS

- Evaluate the success of the different fall chinook release strategies (yearling and fingerling) in the basin.
- Develop a local fall chinook broodstock for the basin.
- Operate programs and facilities to allow for full volitional release of chinook.
- Develop a facility in the lower basin to improve acclimation, rearing and release options for fingerlings and yearlings. WDFW has property and a water right in the lower basin near the Chambers Creek trap that can be used for this purpose.
- Resize the program for current and planned facilities to minimize the need for periodic fish transfers between facilities.
- Operate Chambers Creek Hatchery with Garrison Springs Hatchery for fall chinook fingerlings.
- Transition the Lakewood facility from a chinook production facility to more appropriate species for this facility.
- Enhance educational opportunities at Lakewood to take advantage of the open space at this facility, in the middle of an increasingly urban environment.

COMMENTS

- The water supply and facilities used for the yearling program have a significant potential use for resident fish.
- Rearing and release strategies need to consider potential interspecific effects.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG and has initiated a scoping study (using funding from the Puget Sound Recreational Enhancement account) to evaluate options for developing a

facility in the lower basin. Additional funding will be required to evaluate the success of different release strategies and modify the facilities as recommended.

Garrison Springs Chum

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	High	High	High
Population Viability	At Risk	At Risk	Healthy
Habitat	Inadequate	Inadequate	Limiting
Harvest Opportunity	None	None	Occasional
Hatchery Program:			
Purpose	Conservation		
Type	Integrated		

PROGRAM DESCRIPTION

The Garrison Springs chum stock derives from wild chum collected in Chambers Creek from 1979 to the present. The stock is maintained through adult returns to Chambers Creek trap. Garrison Springs chum salmon belong to the Central/South Puget Sound Fall Chum GDU. Eight other stocks are in this GDU. The purpose of the program is to restore a chum stock that has recently shown steep declines in returning adults. To this end, 50,000 unfed chum fry are released into Flett Creek. Eggs are eyed at Garrison Springs Hatchery and smolts released from a remote site incubator (RSI).

OPERATIONAL CONSIDERATIONS

- Even though this is a small program, because of recent low returns of chum salmon to this watershed, collection of even a small number of eggs could be considered "broodstock mining."

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The benefit of this program to conservation is currently unknown. There is an educational benefit from this program that is linked to watershed protection. If the program is not successful, there is a risk to this population from removing natural spawners from an already depressed population

B. Likelihood of attaining goals?
The likelihood that this program will attain its goal is dependent on the fish released from the remote site incubator being representative of the natural stock and surviving to reproduce at a higher rate than naturally spawning chum. These factors are currently unknown.

C. Consistent with goals for other stocks?
The program is consistent with goals for other stocks.

RECOMMENDATIONS

- Evaluate the success of the RSI program in providing naturally spawning fish in the newly available habitat.
- Use the results of the evaluation to determine if the program should be continued, eliminated or expanded to additional restoration efforts in the basin.
- Address long-term habitat improvement issues. The hatchery program will be successful only if the post-release environment is able to support the population.

COMMENTS

- Recent returns to the basin (1999 and 2000) have been only a few hundred fish, after averaging several thousand per year over the last 30 years.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG but notes that additional funding will be required to evaluate the success of the RSI program.

NISQUALLY RIVER AND DELTA

Overview

STOCK STATUS[33]

Stocks	Hatchery Program?	Biological Significance (L=Low, M =Intermediate, H =High)			Population Viability (L=Critical, M = At Risk, H = Healthy)			Habitat (L = Inadequate, M = Limiting, H = Healthy)			Harvest Opportunity (0 = None, L = Occasional, M = Most years, H = Each year)		
		Now	Goals		Now	Goals		Now	Goals		Now	Goals	
			Short-Term	Long-Term		Short-Term	Long-Term		Short-Term	Long-Term		Short-Term	Long-Term
Nisqually River Fall Chinook	Y	L	M	H	M	M	H	M	M	H	H	H	H
McAllister Creek Hatchery Fall Chinook	Y	L	L	L	L	L	L	L	L	L	H	H	H
Nisqually River Late Coho	N	M	M	M	M	M	M	M	M	H	0	0	L
Nisqually River Coho	Y	L	M	M	L	M	M	L	M	M	L	L	M
Nisqually River Late Chum	N	H	H	H	H	H	H	M/H	H	H	H	H	H
McAllister Creek Chum	N	H	H	H	H	H	H	M	M	H	H	H	H
Nisqually River Pink	N	H	H	H	L	M	H	M	M	H	0	L	M
Nisqually River Steelhead	N	H	H	H	L	M	H	M	M	H	0	M	H

HABITAT

The Nisqually River has the largest estuary in southern Puget Sound and the last major undeveloped delta in Puget Sound. The historic estuary area has been reduced about 30% percent by dikes. Much of the riparian area along the lower river is already in protected status. Of the 40 miles of mainstream accessible to anadromous fishes, 64% is in protected status. The mainstem Nisqually has three dams. The present upstream distribution limit of anadromous fish is river mile 41.4.

The largest watersheds in the Nisqually River Basin are Muck Creek and the Mashel River. Ohop Creek and Tanwax Creek are medium-sized, with stream flows dominated by rainfall. There are a number of smaller, independent drainages. McAllister Creek is a medium-sized, spring water fed creek that flows into Puget Sound through the western edge of the Nisqually Delta. It provides some spawning and good rearing habitat primarily for chum.[34]

Nisqually River spawning sockeye salmon are observed annually, downstream of the Centralia Diversion Dam. The status of native char populations in the basin is unknown. Salmonid habitat condition in the mainstem Nisqually River is currently fair to good. The status of the pink salmon population is depressed at best. The major habitat concerns associated with the mainstem Nisqually River include a loss of functional floodplain due to remnant flood control dikes that reduce side-channel habitats; the loss of portions of the estuary; and the possible loss of coarse sediment transport

[33] *This table contains ratings for all the salmonid stocks in the sub-region, as provided by the managers. For definitions of these ratings, see the* Components of This Report *section of the Introduction.*

[34] *Conservation Priorities: An Assessment of Freshwater Habitat For Puget Sound Salmon, The Trust For Public Land, Seattle, WA, November 2000.*

and large, woody debris recruitment out of the upper mainstem basin, past the Alder and LaGrande water storage and power dams, respectively.

Habitat conditions in the McAllister Creek watershed are currently poor. Major habitat concerns include a significant loss of historic estuary, a reduction in floodplain connectivity, a lack of habitat complexity, and poor substrate condition. Red Salmon Creek is a small, independent tributary to the Nisqually Delta entering along the eastern edge of the delta. The creek is fed by surface water runoff and groundwater. It currently supports steelhead, coho, chum and coastal cutthroat. The overall habitat condition would probably be considered fair. Sequalitchew Creek is a medium-sized independent tributary to Puget Sound located northeast of the Nisqually Delta. The creek is fed by surface water runoff and groundwater and has several lakes, dominated by Lake Sequalitchew, and marsh complexes associated with its upper reaches. Habitat conditions are generally fair in the upstream reaches and generally good in the lower reaches.[35]

HATCHERIES

McAllister Hatchery

McAllister Hatchery is located in South Puget Sound on McAllister Creek at river mile 4.0. McAllister Creek is an independent drainage in the Nisqually Valley, west of the Nisqually River. The hatchery was originally designed to rear large numbers of chum and smaller numbers of delayed-release (yearling) chinook. Today, the primary goal of the programs at McAllister is to raise chinook salmon for recreational harvest in Puget Sound. The present program calls for the release of 300,000 fall chinook yearlings in April at 6 FPP and 1,000,000 zero-age fall chinook in May at 50 FPP. McAllister also provides incubation support for the Tumwater Falls chinook program.[36]

Kalama and Clear Creek Hatcheries

Fall chinook are reared at two tribal facilities on the Nisqually River. Kalama Creek Hatchery is located on a left bank tributary of the Nisqually at approximately river mile 9.2. Clear Creek Hatchery is located on a right bank tributary at approximately river mile 6.2. Kalama Creek Hatchery began releasing fall chinook in 1980 (brood year 1979) and Clear Creek Hatchery began releasing chinook in 1991 (brood year 1990). Both programs began with importation of various South Sound chinook stocks, but the current broodstock policy allows only the use of Nisqually River stocks at both facilities. Incubation and rearing takes place on-station with a release goal of 600,000 zero-age smolts at Kalama Creek Hatchery and 3,500,000 zero-age smolts at Clear Creek Hatchery. Both Kalama and Clear Creek hatcheries also produce coho salmon. Like fall chinook, both of these coho programs began with the importation of several Puget Sound stocks. The present program calls for the release of 350,000 coho smolts at Kalama Creek and 630,000 smolts at Clear Creek. Incubation and rearing take place on-station. The primary goal for both facilities is to produce fish for treaty-reserved fishing opportunity for the Nisqually Indian Tribe and recreational opportunity for Puget Sound recreational fishers.[37]

[35] *John Kerwin, Washington Conservation Commission, July 2001.*

[36] *Rich Eltrich, Washington State Department of Fish and Wildlife, July 2001.*

[37] *John Barr, Nisqually Tribe, July 2001.*

Nisqually River Fall Chinook

Nisqually Tribe

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Intermediate	High
Population Viability	At Risk	At Risk	Healthy
Habitat	Limiting	Limiting	Healthy
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest and Conservation		
Type	Integrated		

PROGRAM DESCRIPTION

The Nisqually River fall chinook at Kalama Creek and Clear Creek hatcheries derive from Green River origin stock from Soos Creek, Puyallup, Tumwater Falls, McAllister and George Adams hatcheries. Kalama Creek Hatchery began releases in 1980 with Soos Creek and Puyallup hatchery fish and has been self-sustaining since 1991. Clear Creek (using Kalama Creek Hatchery fish) began releases in 1991 and has been self-sustaining since 1996. Nisqually River fall chinook belong to the South Puget Sound, Hood Canal, and Snohomish Summer+Fall GDUs. This program's current goal is to support treaty-reserved fisheries for the Nisqually Tribe and recreational fishing in the South Sound region. The long-term goal is to assist with restoration of naturally spawning populations of fall chinook salmon in the Nisqually River. To these ends, eggs are collected from adults returning to the Nisqually River to satisfy the following hatchery production targets: Kalama Creek Hatchery, 630,000 smolts; Clear Creek Hatchery, 3.4 million smolts.

OPERATIONAL CONSIDERATIONS

- Existing genetic data (allozyme data) unable to detect any significant allele frequency differences among the two hatchery stocks, natural-origin chinook in the Nisqually River, and the Green River Hatchery stock. However, sample sizes for naturally spawning fish from the Nisqually River were only 30 and 23 fish in 1998 and 1999, respectively. In contrast, sample sizes for the hatchery stocks ranges from 99 to 106 fish.[38]
- Efforts are made to maintain an effective number of breeders of 1,500–2,500 adult fish per year.
- Pre-spawning mortality of adults is less than one percent.
- All released fish are marked to assess potential contribution of hatchery fish to naturally spawning populations, and to better assess the status of the natural populations themselves.
- Recent changes in harvest management will allow greater escapement and natural spawning. There has been a strong attempt to match smolt releases to the carrying capacity of the Nisqually River and estuary via the *Ecosystem Diagnosis and Treatment (EDT)* model and analyses.

[38] *Data provided by Anne Marshall and Craig Busack, Washington State Department of Fish and Wildlife.*

- The program features a complete volitional release of sub-yearling smolts. A yearling program was terminated recently.
- The program has generated significant numbers of precocious males. Procedures are now in place to address this problem.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?

A high contribution of hatchery-origin fish to harvest indicates that the program is meeting harvest goals and is successful from that perspective. Recent changes in operations and proposed activities in the future are consistent with potentially restoring naturally spawning populations in the Nisqually River.

B. Likelihood of attaining goals?

A high likelihood exists of continuing to achieve harvest goals. Much uncertainty surrounds the ability of the current hatchery stock to establish a viable, self-sustaining, naturally spawning population that can be integrated genetically with the hatchery population. Nevertheless, given the current status of chinook salmon in the Nisqually River, activities to achieve restoration/conservation goals pose little risks, but can potentially yield high benefits.

C. Consistent with goals for other stocks?

The HSRG is concerned about possible impacts of chinook salmon releases on pink and chum salmon fry in the Nisqually River. The risk analysis performed by the Tribe assumes that pink and chum out-migration occurs prior to the release and out-migration of hatchery-origin chinook salmon smolts. If this assumption is wrong, then the hatchery program could potentially be posing risks to those other species. The HSRG is particularly concerned about the status of the pink salmon population, which is rated as being of "high" biological significance, but for which the total estimated escapement has been less than 600 adults in each of the past four brood years (1993, 1995, 1997, 1999). This low number of adults is becoming dangerously close to the level at which genetic concerns are an issue. Thus, risks posed by the hatchery program could be particularly significant.

RECOMMENDATIONS

- Obtain a better understanding of the status of the naturally spawning population of chinook salmon in the Nisqually River. Marking all hatchery-origin smolts prior to release will potentially assist with obtaining this information.
- Introduce an average of 10% naturally spawning fish into the hatchery broodstock each year for on-station releases.
- Conduct additional genetic studies to better understand the genetic relationship between hatchery and naturally spawning populations in the Nisqually River and their relationship to the Green River Hatchery stock. Sample sizes for natural-origin fish from the Nisqually River in previous genetic studies are too small to test, with a desirable level of power, the null hypothesis of a single gene pool for hatchery and natural-origin fish.
- Test and evaluate, via field studies, the assumption that pink and chum out-migration occurs prior to the release and out-migration of hatchery-origin chinook smolts.
- Develop a protection strategy for pink salmon, including an assessment of the effects of the hatchery program at each of the key life history stages. Protection of the existing pink salmon population in the Nisqually River, including if appropriate an enhancement program, is important because of its high biological significance at the southern end of the species' range.

- Address long-term habitat improvement issues. The hatchery program will be successful only if the post-release environment is able to support the population.

COMMENTS

- Recent termination of the yearling program was a positive move towards reducing potential ecological risks.
- The HSRG commends the Nisqually Tribe for initiating a plan to help restore and recover naturally-spawning populations of chinook salmon in the Nisqually River. To this end, the HSRG is reviewing two plans: an adaptive management plan and the stock management section of the *Chinook Salmon Recovery Plan for the Nisqually River*.
- In response to the HSRG's informal verbal review, a Nisqually Tribal biologist noted that Nisqually pink salmon may be heavily affected by the intensive harvests in Canada and those targeting fish returning to the Skagit River in north Puget Sound. The biologist noted that genetic studies to distinguish Nisqually, Skagit, and Canadian stocks of pink salmon might be useful to protect Nisqually River fish in pre-terminal, mixed fisheries. This latter study could be performed by the WDFW Genetics Unit.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG and has taken the following actions with the Nisqually Tribe:

- All hatchery origin smolts have been marked to facilitate identification of the origin of returning adults.
- A three-year study has been initiated to collect samples and analyze the genetic relationship between natural and hatchery spawning populations.

The Nisqually Tribe supports the recommendations of the HSRG (the Tribe's full comments are appended to this document) and has taken the following actions with WDFW:

- All hatchery origin smolts have been marked to facilitate identification of the origin of returning adults.
- A three-year study has been initiated to collect samples and analyze the genetic relationship between natural and hatchery spawning populations.
- The Nisqually Tribe has obtained funds through the tribal hatchery reform efforts to better estimate the escapement contribution of both hatchery and natural origin fall chinook and to better characterize juvenile salmon utilization of the Nisqually River estuary.
- Additional discussion and funding to develop an adequate broodstock collection facility will be required to properly incorporate natural origin recruits into the artificial production program.

McAllister Creek Hatchery Fall Chinook

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[39]	Low	Low	Low
Habitat	Inadequate	Inadequate	Inadequate
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The McAllister Creek Hatchery fall chinook stock derives from transplants primarily from the Deschutes Hatchery in 1984. This stock is Green River origin and has been self-sufficient since the late 1980s. The objective of the program is to support recreational and treaty harvest in Puget Sound. To this end, eggs are collected from adults returning to McAllister Creek Hatchery in sufficient numbers to satisfy the following hatchery production targets: one million sub-yearlings and 300,000 yearlings released per year into McAllister Creek.

OPERATIONAL CONSIDERATIONS

- McAllister Creek Hatchery is located at river mile 4.0 of McAllister Creek, an independent stream draining into the Nisqually River estuary.
- The hatchery was originally built to rear chum salmon.
- The hatchery has a number of significant problems including the following:
    - Presence of the parasite *Nanophyetus salmincola.* in the watershed severely limits the use of the facility to only six months of the year (December through May).
    - This requires the use of a variety of in- and out-of-basin facilities for rearing.
    - There is a very high organic loading of the watershed, due to the prevalence of livestock farms.
    - The hatchery is located too low in the watershed. McAllister Creek at this location is affected by tidal fluctuations and this causes effluent from the hatchery to be entrained with the hatchery intake water during high tides.
    - The hatchery depends exclusively on returning adults to voluntarily enter the hatchery, which has poor attraction water due to its low location within the watershed. As a result, only about two-thirds of the returning fish are trapped, which makes it difficult to meet broodstock requirements. The other one-third of the returning fish remaining in

[39] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

McAllister Creek far exceeds natural spawning habitat capacity. Hatchery fish carcasses further contribute to the high organic nutrient load of the creek.

- Fish exhibit questionable survival and require extensive transfers among different facilities to avoid water quality and disease problems.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The program is providing few benefits. This program and hatchery pose significant risks, because fish must be transferred out of the facility prior to release, due to parasite problems. Risks and biological problems with this hatchery outweigh the questionable benefits of the program.

B. Likelihood of attaining goals?
There is little likelihood that this program or hatchery could ever achieve desired goals, because of physical problems with the facility and parasite problems in the watershed.

C. Consistent with goals for other stocks?
There are potential predation problem from this program's yearling component for Nisqually and McAllister late chum. Multiple transfers increase risk from pathogens.

RECOMMENDATIONS

- Discontinue this program and use of this facility for salmonid culture. Resources devoted to this program and facility could be better used to achieve regional goals.

COMMENTS

- The McAllister Hatchery was built at a very poor site and provides little hope of ever supporting a successful program.

MANAGERS RESPONSE

WDFW supports the termination of the fall chinook program at McAllister Creek Hatchery and is currently proposing this action to the Washington State Legislature. If the program is terminated, alternative uses of the facility will be considered. The Fish and Wildlife Commission has the ultimate authority for determining the use of agency facilities.

Nisqually River Coho

Nisqually Tribe

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Medium	Medium
Population Viability	Critical	Critical	At Risk
Habitat	Inadequate	Limiting	Limiting
Harvest Opportunity	Occasional	Occasional	Most Years
Hatchery Program:			
Purpose	Harvest and Conservation		
Type	Integrated		

PROGRAM DESCRIPTION

The Nisqually River coho program began in 1979 with pre-smolts from George Adams Hatchery on Hood Canal, changed to Skykomish Hatchery stock in 1989, and changed again to Minter Creek Hatchery fish in 1998. Skagit River stock was also used initially for this program. Currently, this program is maintained by annual egg transfers from Minter Creek Hatchery. The objective of this program has been to support treaty-reserved harvest for the Nisqually Tribe and recreational fisheries in the South Sound region. Minter Creek stock is now being used in an attempt to establish a self-sustaining, natural spawning coho population, while conducting an integrated hatchery program to also provide harvest. To these ends, eggs are collected, incubated, and hatched at Kalama Creek Hatchery (350,000 smolts) and Clear Creek Hatchery (630,000 smolts). The fish are reared and released onsite.

OPERATIONAL CONSIDERATIONS

- This program was initially managed as a segregated harvest program using Skykomish River hatchery stock. With the change to the South Sound Minter Creek stock, the long-term goal of the program is now to manage coho salmon as an integrated hatchery program with both harvest and conservation goals.
- To potentially achieve goals for an integrated hatchery program, 125,000 smolts are to be out-planted into Beaver Creek when fish are available.
- Constant temperature ground water is used to rear coho salmon to the smolt stage at Clear Creek Hatchery.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?

This program, with the Skykomish stock, was not meeting either harvest or conservation goals nor was it meeting broodstock needs.

B. Likelihood of attaining goals?
Success will depend on the return rate and survival of Minter Creek stock back to the Nisqually River as part of the revised program. The program's water source may present a risk to proper smoltification and subsequent life history responses of released fish, including survival.

C. Consistent with goals for other stocks?
Hatchery coho smolts may prey on pink salmon fry (see also discussion of Nisqually fall chinook program).

RECOMMENDATIONS

- Reduce program to a size no larger than needed for evaluation of Minter Creek stock.
- Introduce an average of 10% naturally spawning fish into the hatchery broodstock each year for on-station releases. The exact percentage will depend on the status of the natural population. This will require the establishment of a marked hatchery stock and a naturally spawning population.
- Evaluate return rates and contributions to fisheries of new broodstock for three brood years (five to six calendar years), including results of recently-implemented rearing strategies.
- Evaluate the contribution of hatchery fish to the natural spawning population.
- Discontinue the hatchery program for coho salmon in the Nisqually River if survival and return rates do not increase significantly (that is, if the benefits of the program do not outweigh the risks and economic costs).
- Evaluate the contribution to harvest and conservation of the Beaver Creek outplanting program. Continue program if goals are achieved.
- Address long-term habitat improvement issues. The hatchery program will be successful only if the post-release environment is able to support the population.

COMMENTS

- The Nisqually Tribe has taken important steps to rectify poor adult returns including: 1) replacement of the Skykomish stock with a South Sound stock (Minter Creek); and 2) development of alternative rearing strategies (volitional release of smolts, growth modulation via temperature and diet manipulations, and semi-natural rearing).

MANAGERS RESPONSE

WDFW generally supports the recommendations of the HSRG but notes that:

- Eliminating or reducing the size of the program has numerous implications that will require discussion with the Nisqually Tribe.
- Identification of the number of natural-origin spawners incorporated in the hatchery broodstock is a complex topic that will require additional analysis and discussion.

The Nisqually Tribe supports the recommendations of the HSRG (the Tribe's full comments are appended to this document), and notes the following:

- Additional discussion and funding to develop an adequate broodstock collection facility will be required to properly incorporate natural origin recruits into the artificial production program.

DESCHUTES RIVER

Overview

STOCK STATUS[40]

Stocks	Hatchery Program?	Biological Significance (L= Low, M = Intermediate, H = High)			Population Viability (L= Critical, M = At Risk, H = Healthy)			Habitat (L = Inadequate, M = Limiting, H = Healthy)			Harvest Opportunity (0 = None, L = Occasional, M = Most years, H = Each year)		
		Now	Goals		Now	Goals		Now	Goals		Now	Goals	
			Short-Term	Long-Term		Short-Term	Long-Term		Short-Term	Long-Term		Short-Term	Long-Term
Deschutes River Hatchery Fall Chinook	Y	L	L	L	L	?	?	M	M	H	H	H	H
Deschutes River Coho	N	L/M	M	M	L	L	M	L	L	M	0	L	M
Deschutes River Hatchery Steelhead	Y	L	L	L	L	L	L	M	M	M	L	M	M

HABITAT

The Deschutes River, draining into Budd Inlet, is the largest of the southwest Puget Sound-area independent drainages, with a drainage area of about 166 square miles and a length of 52 miles.[41] Included within the sub-region are one large watershed (Deschutes River/Percival Creek), several medium-sized watersheds (Woodland Creek, Woodard Creek, McLane Creek, Green Cove Creek) and a number of smaller independent streams.

The Deschutes River is the second largest watershed south of the Tacoma Narrows. Anadromous salmon and steelhead runs in the Deschutes are artificially introduced, as there is an impassable falls at the upper end of Capitol Lake that was only recently laddered (in the mid-1900s). Chinook production has been managed strictly as a hatchery return, with sporadic releases of varying magnitude and composition released upstream of the hatchery; coho and steelhead are passed upstream of the hatchery facility to spawn naturally throughout the watershed. The lower part of the Deschutes flows through the cities of Olympia and Tumwater, with the majority of the watershed being suburban and agricultural in the lower/middle portions and commercial forest (Weyerhaeuser) in the upper watershed. Composite habitat condition for the Deschutes should probably be considered as fair. Natural salmonid productivity in the watershed is impaired by:

- Lack of large, woody debris and pools, which reduces the habitat complexity,
- Lack of off-channel rearing habitat in the lower watershed,
- Debris flows and stream bank instability that results in high turbidity and high presence of fine sediments in the substrate,
- Altered peak flows from heavily logged areas in the headwaters, agricultural runoff, and urban storm-water runoff,

[40] *This table contains ratings for all salmonid stocks in the sub-region, as provided by the managers. For definitions of these ratings, see the* Components of This Report *section of the Introduction.*

[41] *Conservation Priorities: An Assessment of Freshwater Habitat For Puget Sound Salmon, The Trust For Public Land, Seattle, WA, November 2000.*

- Water quality (high water temperatures and low dissolved oxygen) in the lower river, Capitol Lake, and lower Budd Inlet, particularly in late summer, and
- Adult and juvenile fish passage impacts associated with direct transition between Capitol Lake and Budd Inlet.

Much of the coho production from the Deschutes originated from Huckleberry Creek, which is located on commercial forestland in the upper watershed. A large slide and debris flow eliminated much of the suitable spawning and rearing habitat in Huckleberry Creek. Percival Creek is a medium-sized watershed that also flows into Capitol Lake. Although Percival Creek flows through an urban area, with hydrology significantly impacted by urban storm water runoff, much of the watershed is within a deep ravine with good riparian buffers.

Woodland Creek flows into the southern end of Henderson Inlet, with headwaters in the City of Lacey. It supports stocks of coho, chum, steelhead and cutthroat, plus a low number of chinook. Habitat condition should be generally considered as fair. Woodard Creek flows into the west side of Henderson Inlet, with headwaters in the City of Olympia, flowing through a rapidly urbanizing area northeast of Olympia. It supports stocks of coho, chum, steelhead, and cutthroat. Habitat condition should generally be considered as fair to poor. McLane Creek flows into the southern end of Eld Inlet, on the western edge of WRIA 13. Land use in the watershed is primarily rural residential and forest land. The creek supports stocks of coho, chum, steelhead, and cutthroat. Habitat condition should generally be considered as fair to good, providing good natural production of coho and chum. Green Cove Creek flows into the northwest shoreline of Eld Inlet. It supports stocks of coho, chum, steelhead, and cutthroat. Habitat condition should generally be considered as fair. There are a number of small, independent drainages throughout WRIA 13. These streams have potential to support coho, chum, steelhead, and cutthroat. Habitat conditions should generally be considered as fair to poor.

There are approximately 90 miles of marine shoreline in WRIA 13 (estimate also includes the Eld Inlet shoreline within WRIA 14). Natural shoreline functions have been altered by extensive bulk heading. As of 1993, 31% of the entire marine shoreline was armored (bulk headed), with armoring being as high as 47% in Budd Inlet. Estuarine water quality is also impaired by high water temperature and low dissolved oxygen resulting from freshwater inflow, particularly in lower Budd Inlet.[42]

HATCHERIES

Tumwater Falls

Tumwater Falls Trap/Acclimation Pond is located on the Deschutes River at river mile 2.0, inside the Tumwater Falls Park. The Percival Cove Net Pens facility is located at the mouth of Percival Creek. Percival Creek enters Capitol Lake at its midpoint, on the west shore. Capitol Lake is actually the mouth of the Deschutes River, which was dammed in the early 1950s. The current program calls for the release of 3.8 million chinook fingerings at two locations, Tumwater Falls Park (river mile 3.3) and Percival Cove (river mile 0.5). The goal of both of these programs is to provide for harvest opportunity in sport, commercial and tribal fisheries in Puget Sound and coastal areas.[43]

[42] *Donald Haring, Washington Conservation Commission, March 19, 2001*.

[43] *Rich Eltrich, Washington State Department of Fish and Wildlife, July 2001.*

Deschutes River Hatchery Fall Chinook

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[44]	Low	?	?
Habitat	Limiting	Limiting	Healthy
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Deschutes River hatchery fall chinook stock was derived from Green River origin stock in the 1950s. This stock has been maintained through adult fish returns to the Tumwater Falls Trap on the Deschutes River. The objective of the program is to provide for harvest while avoiding adverse impacts on other fish stocks in the basin. To this end, the program currently releases 3.8 million sub-yearlings as well as 250,000 yearlings (see below). Sub-yearling production is eyed at McAllister Hatchery and Minter Creek Hatchery. Fry are hatched and reared at Wallace River Hatchery (two million; Snohomish drainage) and Coulter Creek Hatchery (1.8 million) via Minter Creek. Yearling production is eyed at McAllister Hatchery and hatched and reared at McKernan Hatchery (Skykomish drainage). Sub-yearling releases include 3.3 million at Tumwater Falls Hatchery and 0.5 million at Percival Cove Pens. 250,000 yearlings are released from Percival Cove Pens.

OPERATIONAL CONSIDERATIONS

- The program uses a variety of facilities, both in- and out-of-region, with extensive transfer of fish.
- The operation in Percival Cove often has poor water quality resulting in poundage limits and early release of juveniles.
- The program requires a waiver of the co-managers' disease policy for rearing on surface water at Wallace Hatchery.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?

The Deschutes River fall chinook program is operated as a segregated harvest program consistent with its short- and long-term goals, and the program provides significant benefits to sport and commercial fisheries. Its location is ideal for significant educational and public outreach benefits.

[44] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

B. Likelihood of attaining goals?
Current facilities are inadequate to realize the goals of the program. Extensive transport is required among a number of facilities both in- and out-of-region increasing the risk of transfer of pathogens. Sub-yearlings are reared on surface water at Wallace Hatchery, requiring a waiver of the disease policy. Further, inadequate water and space result in less than optimal release time and condition and likely decrease survival rates.

C. Consistent with goals for other stocks?
The Deschutes River fall chinook program is operated as a segregated harvest program consistent with the goals for other stocks in the watershed. Risks from yearling production include potential predation on southern Puget Sound chinook, chum, and pink salmon and competition with coho and steelhead.

RECOMMENDATIONS

- Obtain a memorandum of understanding (MOU) from NMFS addressing the potential Endangered Species Act status of chinook spawning naturally above Tumwater Falls, prior to implementing the long-term plans described below.
- Develop long-term plans for rearing and release facilities that eliminate the need for out-of-basin transfers. This requires investment in new facilities in the Deschutes River basin.
- Implement a transitional, in-region program that restricts fish and egg transfers, to be consistent with the co-managers' disease policy. Consider incubation at Minter Creek and rearing at Coulter Creek as part of this transitional program.
- Develop rearing and release locations that eliminate all net pen operations in Percival Cove.
- Provide adequate water and pond space to allow fish to grow and be released at the optimal time and size for maximum survival advantage.
- Develop appropriate pollution abatement or rearing strategies to meet local, state and federal clean water requirements.
- Develop a strong educational component involving local partnerships, given the location of the drainage within a major urban area, the state capitol, and the City of Tumwater.

COMMENTS

- The basin provides a significant opportunity to foster a research component focusing on the productivity of hatchery-origin chinook released to a natural spawning environment.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG and has taken the following actions:
- Pursued discussions with the National Marine Fisheries Service regarding chinook spawning naturally above Tumwater Falls, but have been unable to secure an agreement.
- Initiated the final phase of a scoping process leading to the selection and development of cost estimates for the preferred alternative for new facilities in the Deschutes Basin.
- Reduced the reliance on out-of basin facilities by 40%.

The Squaxin Island Tribe's full comments are appended to this document.

Deschutes River Hatchery Steelhead

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[45]	Low	Low	Low
Habitat	Limiting	Limiting	Limiting
Harvest Opportunity	Occasional	Most Years	Most Years
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Deschutes River hatchery steelhead program relies on annual outplants of Chambers Stock from Puyallup, Tokul or Eells Spring hatcheries. From 1975–96, this program was maintained primarily by adult returns to Eells Spring Hatchery. From 1997 until the present, this program has been maintained primarily through adult returns to Puyallup Hatchery. The objective of this program is to provide for harvest while avoiding adverse interactions with other fish stocks in the watershed. To this end, 25,000 yearlings are released into the Deschutes drainage. Eggs are hatched and the hatch reared at Puyallup Hatchery.

OPERATIONAL CONSIDERATIONS

- Fish are reared at Puyallup Hatchery, which is located in a region that has yet to be reviewed by the HSRG.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
Minimal harvest opportunity benefits are presently being obtained. This may be due to the low numbers of smolts being released or to the quality of smolts being released.

B. Likelihood of attaining goals?
If the future goal of increased harvest is to be realized, the two factors mentioned above will need to be examined.

C. Consistent with goals for other stocks?
There is the potential for competition with, and predation on, coho, cutthroat and chinook.

[45] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

RECOMMENDATIONS

- Implement Area-Wide Recommendations regarding establishing a regional system of "wild steelhead management zones" where streams are not planted with hatchery fish and are instead managed for native stocks. Fishing for steelhead in these zones would not be incompatible with this approach, but no hatchery-produced steelhead should be introduced. Such zones would reduce the risk of naturally spawning fish interbreeding with hatchery fish, and provide native stocks for future fisheries programs.
- Select streams to represent a balance of large and small streams, productivity, etc. Hatchery production may need to be increased in streams selected for hatchery harvest. The HSRG encourages the use of locally-adapted stocks for those streams.
- Minimize interaction with naturally spawning steelhead when implementing a segregated steelhead program through such tools as differential timing and a decision on benefits versus risks on outplanting in freshwater habitat. In addition, adult collection procedures should be designed to capture as many adults from the returning segregated population as possible.
- Organize a workshop to develop this concept.
- Include monitoring and evaluation as a basic component of the concept, for both wild steelhead management zones and hatchery harvest streams.
- Develop on-site incubation and rearing with the new hatchery facility described in recommendations for Deschutes River fall chinook program.
- Release hatchery yearling steelhead smolts between May 1 and May 15, at a target size of six to the pound, and at a condition factor of less than 1.0.
- Evaluate potential competition and predation on coho, cutthroat and chinook to determine appropriate program size.

COMMENTS

- Increasing smolt quality and/or release numbers will probably be necessary to meet desired harvest opportunity goals. These benefits must be balanced against the risks to other species; however, due to a natural migrational blockage, the risk to native stocks is limited to non-migratory species.

MANAGERS RESPONSE

WDFW supports the recommendations and has initiated, with funding provided by the HSRG, studies to evaluate the risks posed by competition and predation by hatchery origin smolts.

SQUAXIN/SOUTH SOUND NET PENS AND INDEPENDENT TRIBUTARIES

Overview

STOCK STATUS[46]

Stocks	Hatchery Program?	Biological Significance (L=Low, M =Intermediate, H =High)			Population Viability (L=Critical, M = At Risk, H = Healthy)			Habitat (L = Inadequate, M = Limiting, H = Healthy)			Harvest Opportunity (0 = None, L = Occasional, M = Most years, H = Each year)		
		Now	Goals		Now	Goals		Now	Goals		Now	Goals	
			Short-Term	Long-Term		Short-Term	Long-Term		Short-Term	Long-Term		Short-Term	Long-Term
So. Sound Indep. Trib. Coho	N	M	M	M	M	M	M	M	M	M	H	H	M
Squaxin/S Sound Net Pens Hatchery Coho	Y	L	L	L	L	L	L	L	L	M	H	H	H
So. Sound Indep. Trib. Normal Chum	N	H	H	H	H	H	H	M/H	H	H	H	H	H
So. Sound Indep. Trib. Summer Chum	N	H	H	H	M/H	H	H	M	M	H	M	M	H
So. Sound Indep. Trib. Steelhead	N	M	H	H	L	L	M	L	L	M	0	0	0

HABITAT

This region consists of a complex system of streams, estuaries, and extensive marine inlets on the southwest terminus of Puget Sound. From south to north, Eld Inlet, Totten Inlet, Little Skookum Inlet, and Hammersley Inlet/Oakland Bay are the primary marine water bodies in this region. For all streams in this region, the extensive estuary mud flats along the inlets have been historically rich production areas for shellfish, as well as marine and anadromous fish.[47] There are at least 36 independent drainages to saltwater in WRIA 14 that have been identified as supporting anadromous salmonids, with several of the watersheds providing what would be considered as fair to good coho, chum, steelhead, and cutthroat habitat. Adult chinook presence is also documented in several of the larger watersheds, although these do not have "typical chinook habitat." Collectively, the natural coho, chum, and cutthroat production is very significant.

The larger watersheds of particular note include Schneider, Kennedy, Skookum, Mill/Goznell, Goldsborough, Johns, Cranberry, Deer, and Sherwood creeks. Kennedy Creek has perhaps the highest documented chum spawner density of any Puget Sound stream. Coho and chum spawner densities are also high in several of the other watersheds. Although there are habitat impairments identified in each of the watersheds, development densities are generally low and habitat conditions are generally in good condition when compared to other Puget Sound watersheds. Productivity is also enhanced by high quality estuarine habitat present throughout the sub-region's marine inlets[48].

[46] *This table contains ratings for all salmonid stocks in the sub-region, as provided by the managers. For definitions of these ratings, see the* Components of This Report *section of the Introduction.*

[47] *Conservation Priorities: An Assessment of Freshwater Habitat For Puget Sound Salmon, The Trust For Public Land, Seattle, WA, November 2000.*

[48] *Donald Haring, Washington Conservation Commission, March 19, 2001*.

HATCHERIES

South Sound Net Pens

The Squaxin Island/South Sound Net Pen enhancement facility is a harvest-oriented program that has been in operation since the early 1970s. The complex is located in southern Puget Sound near Squaxin Island in Peale Passage. The program is co-managed by WDFW and the Squaxin Island Tribe. Under agreement, the Tribe provides labor and maintenance while the State supplies fish, feed, and technical assistance. The primary goal of the net-pen program is to provide for harvest opportunities of adult coho salmon in a terminal area fishery. Production from this facility provides harvest for Squaxin tribal fishermen exercising treaty fishing rights and recreational fishers in Southern Puget Sound. The current production goal is to rear 1.8 million coho smolts for delayed release in June at a size of 10 fish per pound. Historically, production at the pens has averaged 2.3 million coho, but due to recent ocean conditions and poor survival the production goal was reduced.[49]

[49] *Will Henderson, Squaxin Island Tribe and Rich Eltrich, Washington State Department of Fish and Wildlife, July 2001.*

Squaxin / South Sound Net Pens Hatchery Coho

Squaxin Tribe and Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[50]	Low	Low	Low
Habitat	Inadequate	Inadequate	Limiting
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

Egg sources for this program include the Wallace River in the Skykomish drainage and the Minter Creek Hatchery stock that originated from Minter Creek and the Green and Skagit rivers. The purpose of this program is to provide pre-terminal and terminal sport harvest and terminal area treaty harvest in southern Puget Sound. To this end, 1.8 million yearlings at ten to the pound are released into Peale Passage. Eggs are collected at Wallace River Hatchery (Skykomish drainage) and incubated at Wallace River and Marblemount hatcheries (Skagit drainage). Rearing takes place at Wallace River (400,000) for direct transfer to the net pens and at Skookumchuck Ponds (1.4 million) (Chehalis drainage) for the component transferred through Marblemount Hatchery.

OPERATIONAL CONSIDERATIONS

- This program relies on egg take, incubation, and rearing at multiple facilities in several drainages.
- Fish are released at a larger size, and generally later, than freshwater coho yearlings.
- The program has used a variety of coho stocks, primarily Issaquah Creek, southern Hood Canal, Skykomish River, and southern Puget Sound stocks.
- The current production goal is 1.8 million fish, which is reduced from a previous average of 2.3 million fish.
- All released fish are marked to allow for assessment of harvest contribution from the hatchery release and evaluation of the status of natural stocks.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?

This program is generally consistent with the defined harvest goals. However, non-treaty harvest opportunities have been limited.

[50] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

B. Likelihood of attaining goals?

The likelihood of attaining harvest goals for this program will be dependent on an overall improvement of survival from the net pen releases, as well as improved access to harvest by the non-treaty fishery. Use of non-local broodstock and multiple transfers of fish resulting from out-of-basin rearing may be contributing to lowered survival. Another risk that could affect the long-term success of this program is the current process of transferring these fish through several watersheds, which could interrupt the net pen program should a serious pathogen problem be identified in one of the rearing locations. This has the potential to halt transfers necessary to fulfill the current program.

C. Consistent with goals for other stocks?

The biological significance of naturally spawning coho stocks in the independent South Sound tributaries was rated as intermediate or high. Because of these ratings, there is reason to be concerned about the effects of the net pen program on these stocks, both from straying and ecological interactions. Straying risks include potential failure to meet goals for biological significance and population viability. Risks from ecological interactions include potential competition with other South Sound coho stocks, resulting in an overall loss of productivity. Risks to non-coho populations include potential predation on southern Puget Sound chinook, chum, and pink salmon and competition with steelhead.

RECOMMENDATIONS

- Quantify the amount of straying from South Sound Net Pens to South Sound coho tributaries.
- Compare the genetic and life history characteristics among South Sound, Skykomish and Minter Creek coho populations.
- Compare rates of straying between in-region and out-of-region incubation and rearing.
- During these evaluations, relocate incubation and rearing within the region to the extent that space exists at regional facilities.
- Evaluate benefits and risks of using Skykomish stock versus a within-region stock, probably Minter Creek Hatchery.
- During these evaluations, change the broodstock source for this program to a local broodstock.
- Develop a long-term strategy based on the results of the analyses described above and other relevant information.
- Do not increase the size of the program beyond the current level of 1.8 million fish, at least during this period when survival is depressed for many stocks possessing a yearling life history strategy.

COMMENTS

- The co-managers are currently exploring the redefinition of South Sound coho regional management strategies through the Comprehensive Coho planning process.
- Current survival rates (brood year 1988–94) have averaged 3.7 %, approximately 25% of the survival rate achieved during the 1970s and approximately 30% of the survival rates for brood years 1981–87.
- Contribution of this program (based on expanded use of coded wire tags) to the South Sound 13D net fishery for the period 1985–98 has ranged from 46%–100%, averaging 63.8%. In 1999, that catch was the lowest on record (5,038 fish) and the program contribution was only 1.6% of the catch.

- The HSRG is concerned about the carrying capacity of southern Puget Sound, and its effect on current survival rates of all species with the yearling life history strategy, including natural and hatchery chinook, coho and steelhead.
- This program's out-of-region rearing also creates risks for stocks in the Skagit and Chehalis watersheds, and competition for hatchery resources.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG.

The Squaxin Island Tribe's full comments are appended to this document.

KEY PENINSULA

Overview

STOCK STATUS[51]

Stocks	Hatchery Program?	Biological Significance (L=Low, M =Intermediate, H =High)			Population Viability (L=Critical, M = At Risk, H = Healthy)			Habitat (L = Inadequate, M = Limiting, H = Healthy)			Harvest Opportunity (0 = None, L = Occasional, M = Most years, H = Each year)		
		Now	Goals		Now	Goals		Now	Goals		Now	Goals	
			Short-Term	Long-Term		Short-Term	Long-Term		Short-Term	Long-Term		Short-Term	Long-Term
White River Spring Chinook (Hupp Springs)	Y	H	H	?	L	L	?	L	L	?	L	L	?
Minter Creek Hatchery Fall Chinook	Y	L	L	L	L	L	L	L	L	L	H	H	H
Coulter Creek Hatchery Fall Chinook	Y	L	L	L	L	L	L	L	L	L	H	H	H
Fox Island Net Pens Hatchery Fall Chinook	Y	L	L	L	L	L	L	L	L	M	H	H	H
Minter Creek Coho	Y	M	M	M	M	M	M	M	M	M	H	H	H
Fox Island Net Pens Hatchery Coho	Y	L	L	L	L	L	L	L	L	M	H	H	H
Minter Creek Chum	Y	L	L	L	H	H	H	M	M	M	H	H	H
Minter Creek Pink	Y	L	L	L	L	L	L	L	L	L	0	0	0

HABITAT

There are 46 independent, low-elevation drainages to saltwater with salmonid presence that flow into the Gig Harbor Peninsula/Key Peninsula/Islands portion of southeast WRIA 15, including over 58 miles of stream known to be used by anadromous salmonids (with additional stream length used by cutthroat). Streams within this sub-region originate in the lowland hills of the Kitsap Peninsula and empty into several large inlets within western Puget Sound. Although this sub-region contains no major river systems, many of these streams historically supported substantial salmon runs. Currently, several stream systems contribute significantly to the salmon production of this sub-region, although nearly all watersheds on the eastern Peninsula have been impacted to some degree by land use.[52]

All of these drainages support cutthroat, most support coho and chum, many support steelhead, and some of the larger ones have documented adult chinook returns, although they do not have "typical chinook habitat." Habitat conditions vary within and between streams, ranging from good to very poor. Habitat condition in several of the smaller streams is unknown. Collectively, and particularly when considered in conjunction with the streams in WRIA 14, these streams represent significant potential natural coho, chum, and steelhead production.

The largest streams are Minter, Coulter, Rocky, Burley and Purdy creeks. Minter Creek is the largest of the watersheds in this sub-region (~10,000 acres) and enters the west shoreline of Carr Inlet. The watershed supports coho, chum, steelhead, cutthroat and chinook. The Minter Creek watershed is experiencing population growth and development pressure, and habitat condition varies from poor to

[51] *This table contains ratings for all salmonid stocks in the sub-region, as provided by the managers. For definitions of these ratings, see the* Components of This Report *section of the Introduction.*

[52] *Conservation Priorities: An Assessment of Freshwater Habitat For Puget Sound Salmon, The Trust For Public Land, Seattle, WA, November 2000.*

good between different reaches. Coulter Creek enters the north end of Case Inlet, and supports natural coho, chum, steelhead, cutthroat and chinook. Much of the Coulter Creek watershed is operated as a private tree farm (Overton Tree Farm). Consequently, development within the watershed is low, there are few road encroachments on the stream channel, and freshwater and estuarine habitats are in generally good condition and thought to be very productive.

The Burley Creek watershed enters Burley Lagoon at the north end of Carr Inlet, and supports coho, chum, steelhead, cutthroat and chinook (chinook are probably of hatchery origin). The watershed is experiencing population growth and development pressure, and habitat condition varies from poor to good between different reaches. Rocky Creek enters the east shoreline of Case Inlet, and supports natural coho, chum, steelhead, cutthroat and chinook. Habitat conditions in Rocky Creek are generally fair to good. Purdy Creek enters the east shoreline of Burley Lagoon at the north end of Carr Inlet, and supports coho, chum, steelhead, cutthroat and chinook (chinook are probably of hatchery origin). The watershed is experiencing population growth and development pressure, and habitat condition varies from good in the lower watershed to poor in some upstream reaches.[53]

HATCHERIES

Minter Creek Hatchery

Minter Creek Hatchery is a harvest supplementation and stock recovery facility located on Minter Creek, a tributary to Carr Inlet, in south Puget Sound, approximately 10 miles west of Gig Harbor. The station was constructed in 1936 under a Works Progress Administration (WPA) contract, with the federal government furnishing materials and labor. It was operated as a research station until about 1960 when its primary function shifted to a harvest augmentation program. Beginning in 1993, the hatchery underwent a major renovation (mostly completed). Minter Creek Hatchery currently serves as the hub for several satellite facilities, including Coulter Creek Hatchery, Hupp Springs Hatchery, and the Fox Island Net Pens. Since the early 1980s, the hatchery has been involved in the restoration of the ESA-listed White River spring chinook. Minter Creek Hatchery now provides adult trapping, transportation and incubation support for Hupp Springs Hatchery. It also operates as a production facility for fall chinook, coho, pink and chum for various Puget Sound fisheries. Minter Creek Hatchery provides incubation and short-term rearing for other facilities, co-ops, and enhancement and educational projects in south Puget Sound.

Coulter Creek Hatchery

Coulter Creek Hatchery is located approximately two miles north of Allyn on State Highway 3. It operates as a harvest supplementation program. It was built in 1980 as part of a hatchery enhancement program to increase the production of chum salmon for an all citizen fishery. The hatchery is operated as a satellite of Minter Creek Hatchery and is supported by Minter. The Coulter Creek Hatchery program is designed to rear and transfer fall chinook to the Fox Island Net Pens, South Puget Sound Complex at Tumwater, to out-plant fingerling chinook on-site, and to provide yearling coho for the Agate Pass Net Pens, a cooperative project between WDFW and the Suquamish Tribe. The production program consists of 1.8 million fall chinook to be transferred to South Sound Complex, at Tumwater, at 150/lb, one million fall chinook to be released on station at 80/lb, and 350,000 yearling coho to be transferred to Agate Pass net pens at 25/lb. Coulter is also rearing 300,000 fall chinook for transfer to Fox Island Net Pens at 25/lb.[54]

[53] *Donald Haring, Washington Conservation Commission, March 19, 2001*.

[54] *Dennis Popochock, Washington State Department of Fish and Wildlife, July 2001.*

Hupp Springs Hatchery

Hupp Springs Hatchery was built in 1979. The hatchery is located on Minter Creek, approximately three-quarters of a mile upstream from Minter Creek Hatchery. The original program called for rearing and releasing chum and delayed release fall chinook. The program was quickly changed and dedicated to the restoration of the depleted White River spring chinook. Spring chinook adults are captured at Minter Creek Hatchery and held for transfer to Hupp Springs Hatchery. The maximum release capacity for the facility is approximately 90,000 yearling chinook and 250,000 sub-yearling chinook. This station supports the recovery program for the White River Spring Chinook, an ESA-listed stock.[55]

Fox Island Net Pens

The Fox Island Net Pens are located in Echo Bay, on the north side of Fox Island, in Pierce County. The station was established in September 1975 and was designed to augment the sports fishery in southern Puget Sound by increasing residualization of fall chinook and coho. The current total release capacity is 320,000 yearling salmon per year. The Fox Island Net Pens were closed, effective July 1, 2001.[56]

[55] *Sherman Davis, Washington State Department of Fish and Wildlife, July 2001.*

[56] *Jon Lovrak, Washington State Department of Fish and Wildlife, July 2001.*

White River Spring Chinook (Hupp Springs)

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	High	High	?
Population Viability	Critical	Critical	?
Habitat	Inadequate	Inadequate	?
Harvest Opportunity	Occasional	Occasional	?
Hatchery Program:			
Purpose	Conservation		
Type	Integrated		

PROGRAM DESCRIPTION

The White River spring chinook (Hupp Springs) stock derives from fish collected in the Puyallup and White rivers from the late 1970s through the early 1980s, when the entire spring chinook run was trapped and moved into the hatchery or raised as captive brood. At one point, fewer than 30 fish per year remained. Captive brood were reared at the NMFS Manchester site and the South Sound net pens, to rapidly expand the program. This stock is maintained through adult returns to Minter Creek Hatchery. This stock is also maintained at White River Hatchery (Muckleshoot Tribe), which began with transfers from Hupp Springs' production. The White River spring chinook stock is maintained outside of its natal drainage for conservation purposes. This belongs to, and is the only stock within, the South Puget Sound Spring Chinook GDU. The objective of this program has been to support the recovery of the White River chinook salmon through an integrated conservation program and to maintain the gene pool at the Minter Creek/Hupp Springs complex. To this end, 370,000 eggs from adults returning to Minter Creek Hatchery are collected to produce annual releases of 250,000 sub-yearlings and 85,000 yearlings, with eggs and fry beyond the goal being transferred to the White River acclimation ponds and White River Hatchery. The program uses Minter Creek Hatchery for adult trapping and egg incubation. Unfed fry are transported to Hupp Springs Hatchery for rearing until release.

OPERATIONAL CONSIDERATIONS

- Returning adults are tagged and segregated from fall chinook salmon returning to Minter Creek.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?

The objective of this program has been to support the recovery of the White River chinook salmon through an integrated conservation program. The goal of an integrated program is to minimize the potential genetic divergence between the hatchery broodstock and the naturally spawning populations. However, no infusion of naturally spawning individuals into the broodstock has occurred in this program since the captive brood program was initiated three to four generations ago. This presents a significant risk of domestication and genetic divergence between the broodstock and

populations targeted for restoration. Further, this continued infusion of domesticated genetic material might retard adaptation of hatchery-origin populations to the natural environment.

B. Likelihood of attaining goals?
This program has played an important role in the restoration of White River spring chinook, but continued infusion of genetic material from the three to four generation hatchery population into that once again present in the White River could retard adaptation of the latter population to the natural environment

C. Consistent with goals for other stocks?
Considerable effort has been expended to maintain the integrity of fall chinook salmon returning to Minter Creek. Risks to that stock from the White River spring chinook program appear to be within acceptable limits.

RECOMMENDATIONS

- Discontinue the conservation program, unless this program is demonstrated to be critical to the conservation effort on White River spring chinook.
- If the conservation program continues, implement protocols to reduce domestication and minimize genetic changes resulting from artificial propagation.
- If the goals of the program change, the program should be reevaluated.
- Address long-term habitat improvement issues. The hatchery program will be successful only if the post-release environment is able to support the population.

COMMENTS

- The HSRG will evaluate the role of Hupp Springs in the current White River recovery program during its review of the Central Puget Sound region in 2002.
- This program has played an extremely important role in the recovery of the White River during a period in which the stock was at an extreme risk of extirpation. However, the importance of the current program has changed with the reintroduction of naturally spawning populations in the White River drainage.

MANAGERS RESPONSE

WDFW generally supports the recommendations of the HSRG, but notes that:
- WDFW and the tribes need to evaluate the contribution of this program to the recovery of White River spring chinook.
- Identification of the number of naturally origin spawners incorporated in the hatchery broodstock is a complex topic that will require additional analysis and discussion.

Minter Creek Hatchery Fall Chinook

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[57]	Low	Low	Low
Habitat	Inadequate	Inadequate	Inadequate
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Minter Creek hatchery fall chinook program was derived from fish of Green River origin. There is no native fall chinook stock in Minter Creek. This program is maintained through adult returns to the hatchery trap. The objective of this program is to provide fish for harvest while avoiding adverse interactions with other fish stocks in the region. To this end, 1.8 million fingerlings are released annually into Minter Creek. Eggs are incubated at the hatchery, where the resulting fry are reared until release.

OPERATIONAL CONSIDERATIONS

- None of the broodstock is passed into Minter Creek to spawn.
- Releases are marked to allow harvest of hatchery fish while protecting naturally spawning fish.
- Fish are not tagged.
- Returns to the hatchery are currently surplus to hatchery broodstock needs because of a lack of a satisfactory level of harvest.
- Change to an earlier run timing has occurred over the years, complicating the separation of this stock at the hatchery from returning adults of the White River spring chinook stock.
- The number of programs and a water supply problem at Minter Creek Hatchery compromise the effectiveness of the fall chinook and other programs at the hatchery.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The program is consistent with the goals for the stock.

B. Likelihood of attaining goals?
The program is providing for harvest and is being operated in a segregated manner.

[57] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

C. Consistent with goals for other stocks?
The program is generally consistent with the goals for other South Sound stocks.

RECOMMENDATIONS

- Eliminate two programs (the pink and fall chum programs) at Minter Creek Hatchery (see relevant reviews for these programs). This will reduce constraints to the fall chinook program.
- Reverse, over time, the problem of earlier run timing in the fall chinook stock to avoid compromising its ability to contribute to harvest and to achieve a better separation between the timing of its return and that of the White River spring chinook stock.
- Upgrade the water supply system at the hatchery.

COMMENTS

- Adjusting the run timing of fall chinook at Minter Creek Hatchery would reduce the level of adult handling currently required to separate them from the White River spring chinook, both of which return to the hatchery at the same time. It would also result in a stock more closely resembling the one from which it was derived.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG.

Coulter Creek Hatchery Fall Chinook

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[58]	Low	Low	Low
Habitat	Inadequate	Inadequate	Inadequate
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Coulter Creek hatchery fall chinook program relies on annual transfers of Minter stock, Coulter Creek Hatchery adult returns, and Tumwater Falls Hatchery as a backup. These fish were of Green River origin. This program's objective is to produce fish for harvest and to do so in a manner that minimizes adverse effects on other local stocks. To this end, eggs are collected, incubated, and hatched at Minter Creek Hatchery. Resulting fry are reared at Coulter Creek Hatchery for transfer to Fox Island Net Pens (which have been closed) and the South Puget Sound Complex at Tumwater Falls (1.8 million fingerlings). Releases are also made onsite directly into Coulter Creek (one million smolts).

OPERATIONAL CONSIDERATIONS

- Coulter Creek Hatchery was built in 1980 as part of a hatchery enhancement program to increase the production of chum salmon.
- The facility is now being used to rear, transfer and release fall chinook. The hatchery has no incubation capability.
- A dam provides an adult barrier and an impoundment to supply pumped water from Coulter Creek to two one-third acre rearing ponds. Due to pond design and fish health problems, an extended fall chinook rearing program was dropped.
- Coulter Creek does not have a pollution abatement pond and uses a naturally impounded area for settling out pond waste materials. Coulter Creek meets NPDES discharge levels, but the addition of an abatement system would upgrade the facility.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The data indicate that there is a limited contribution to a terminal harvest.

[58] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

B. Likelihood of attaining goals?
The program has been discontinued.

C. Consistent with goals for other stocks?
Because chum in Coulter Creek are managed for natural production, all returning chinook and chum adults are passed upstream. Returning chinook have a significant negative ecological impact as a result of redd superimposition on Coulter Creek chum salmon. Water quality at Coulter Creek in the fall and winter months can become a problem depending on the number of returning adults.

RECOMMENDATIONS

- Use the resources dedicated to this program at Coulter Creek elsewhere to better achieve regional goals for chinook salmon.
- Discontinue the release of chinook salmon on station (the HSRG has been informed that the release of chinook salmon into Coulter Creek has been discontinued since this recommendation was made).

COMMENTS

- Coulter Creek also provides yearling coho for the Agate Pass Net Pen program, which will be reviewed as part of the Central Puget Sound regional review.

MANAGERS RESPONSE

WDFW has implemented the recommendation of the HSRG to discontinue releases of chinook at Coulter Creek.

Fox Island Net Pens Hatchery Fall Chinook

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[59]	Low	Low	Low
Habitat	Inadequate	Inadequate	Limiting
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Fox Island Net Pens hatchery fall chinook program relied on annual transfers from Minter Creek Hatchery. These fish were of Green River origin. The objective of this program was to provide fish for harvest and to do so in a manner that minimized adverse effects on other stocks. To this end, 240,000 yearling fall chinook salmon were released into Echo Bay. Eggs were collected, incubated, and hatched at Minter Creek Hatchery. Unfed fry were transferred to Coulter Creek Hatchery for additional rearing and transfer to the net pens.

OPERATIONAL CONSIDERATIONS

Not applicable (see Comments section below).

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The program contributed to harvest.

B. Likelihood of attaining goals?
This program has been discontinued.

C. Consistent with goals for other stocks?
There was a concern about straying in South Sound and negative interaction such as predation on other stocks.

RECOMMENDATIONS

Not applicable (see Comments section).

[59] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

COMMENTS

- WDFW has terminated the program, and discontinued use of the net pens.

MANAGERS RESPONSE

None.

Minter Creek Coho

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Intermediate	Intermediate	Intermediate
Population Viability	At Risk	At Risk	At Risk
Habitat	Limiting	Limiting	Limiting
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest and Education		
Type	Integrated		

PROGRAM DESCRIPTION

The Minter Creek coho stock derived historically from Minter Creek, and the Green and Skagit rivers. The inflow of Green and Skagit river fish stopped around 1980. This stock has been maintained by adult returns to Minter Hatchery for the past 25 years. Minter Creek coho belong to the Puget Sound/ Strait of Georgia ESU. The purpose of the program is to provide harvest, while minimizing adverse interactions with other local stocks. To this end, approximately 1.4 million yearlings are released annually on-station. Eggs are collected, incubated, hatched and reared at Minter Creek Hatchery. One million eyed eggs are collected for the Nisqually Hatchery coho program; 450,000 are collected for the Agate Pass net pens.

OPERATIONAL CONSIDERATIONS

- Run timing is increasingly early.
- All releases are mass-marked (adipose fin clipped).

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
This program is consistent with the harvest and education goals, but does not have the broodstock management plan needed to achieve goals of an integrated program.

B. Likelihood of attaining goals?
The program is providing significant harvest benefits, and also educational benefits (providing 65 schools with aquariums of eyed eggs). Increasingly early egg-take timing, decreasing size of returning adults and other domestication effects could decrease the viability of the population over time.

C. Consistent with goals for other stocks?
Magnitude of yearling releases poses some risk to local chum stocks.

RECOMMENDATIONS

- Collect sufficient gametes across entire run-timing, cull as needed to assure proportionate normal timed egg-take for rearing.
- Introduce an average of 10% naturally spawning fish into the hatchery broodstock each year for on-station releases.
- Upgrade the water supply system at the hatchery.

COMMENTS

- The Minter Creek coho program plays an integral role for meeting this region's goals.
- The HSRG and the managers discussed reducing the on-station releases from approximately 1.4 million to approximately one million. Subsequently, WDFW decided to make this change in the program.
- Minter Creek also provides coho for the Agate Pass Net Pen program, which will be reviewed as part of the Central Puget Sound regional review.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG but notes that:

- Identification of the number of naturally origin spawners incorporated in the hatchery broodstock is a complex topic that will require additional analysis and discussion;
- Additional funds will be required to upgrade the water supply system at the hatchery.

Fox Island Net Pens Hatchery Coho

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[60]	Low	Low	Low
Habitat	Inadequate	Inadequate	Limiting
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Fox Island Net Pens hatchery coho program relied on annual transfers from Minter Creek Hatchery. This program used Minter Creek stock and operated from the early 1970s through 2001. The purpose of the program was to provide for harvest while minimizing adverse interactions with other local stocks. To this end, 40,000 (at ten fish per pound) and 10,000 age two-plus coho were released into Echo Bay. Eggs were collected, incubated, and hatched at Minter Creek Hatchery, where rearing until transfer to the net pens also occurred.

OPERATIONAL CONSIDERATIONS

None.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The program contributed to harvest.

B. Likelihood of attaining goals?
See above comment.

C. Consistent with goals for other stocks?
There was a concern about straying in the Sound and negative interactions, such as predation on other stocks.

RECOMMENDATIONS

Not applicable (See Comments section).

[60] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

COMMENTS

- WDFW has terminated the program, and discontinued use of the net pens.

MANAGERS RESPONSE

None.

Minter Creek Chum

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability	Healthy	Healthy	Healthy
Habitat	Limiting	Limiting	Limiting
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Integrated		

PROGRAM DESCRIPTION

The original Minter Creek fall chum program began with introductions from Hoodsport Hatchery on Hood Canal. In the late 1980s, that stock was replaced by introduction of Elson Creek fish, a South Sound stock, for a period of five years. The program is currently maintained by returns to Minter Creek Hatchery. Minter Creek chum belong to the South Puget Sound Fall Chum GDU. There are eleven other stocks within this GDU. The objective of the program is to provide fish for harvest, while minimizing genetic divergence from the naturally spawning stock. To this end, two million fry at 450 fish per pound are released annually into Minter Creek. The eggs are incubated at the hatchery and fry are released on-site.

OPERATIONAL CONSIDERATIONS

- Returns surplus to hatchery needs are passed upstream to spawn in Minter Creek.
- Releases from the hatchery are unmarked.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The program is being operated in a manner consistent with its short- and long-term goals.

B. Likelihood of attaining goals?
The program has provided fish for harvest, but this opportunity has been underused.

C. Consistent with goals for other stocks?
The program is generally consistent with the goals for other stocks, but its very great success, coupled with the lack of a suitably intense harvest, is resulting in water quality problems at Minter Creek Hatchery that adversely affect coho and chinook programs at the hatchery.

RECOMMENDATIONS

- Suspend the chum program at Minter Creek until such time as a need for the program is identified.
- Manage chum salmon in Minter Creek for natural reproduction and to minimize unnecessary water quality problems at the hatchery.

COMMENTS

- Hatchery capacity at Minter Creek would be more effectively used to achieve the managers' regional goals if the fall chum program was suspended.
- Cessation of the chum program at Minter Creek Hatchery would have implications for co-op programs that depend on Minter Creek for their chum salmon supply. Solutions to this problem would have to be sought.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG and has taken the following actions:

- Reduced the size of the program by 75%.
- Proposed to the Washington State Legislature the termination of this program.

Minter Creek Pink

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability	Critical	Critical	Critical
Habitat	Inadequate	Inadequate	Inadequate
Harvest Opportunity	None	None	None
Hatchery Program:			
Purpose	Conservation		
Type	Integrated		

PROGRAM DESCRIPTION

The Minter Creek pink program began with introductions from South Prairie Creek (Puyallup River drainage) brood stock, beginning in 1989. This program is maintained by returns to the Minter Creek Hatchery. Minter Creek pinks belong to the Puyallup Pink GDU. The objective of the program is to establish an introduced stock. To this end, 90,000 fry are released into the Minter Creek drainage annually. Eggs are incubated at Minter Creek Hatchery, where they are hatched and released at 450 fish per pound or smaller.

OPERATIONAL CONSIDERATIONS

- There are no naturally spawning pink salmon in the Key Peninsula sub-region. The stock has a low biological significance.
- The number of adults is insufficient to maintain an effective population size of 1,000.
- Fish are released with no mark or tag.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The goals for this stock do not justify the program. Although this is described as a conservation program, there are no conservation goals for this stock.

B. Likelihood of attaining goals?
Conservation benefits are minimal or unknown. Because of the way broodstock is collected, the program does create a risk of domestication to the stock.

C. Consistent with goals for other stocks?
The program is generally consistent with the goals for other South Sound stocks.

RECOMMENDATIONS

- Terminate the program because no evidence has been presented that it is contributing or will contribute to its conservation goal.
- Allow returning fish to pass upstream and attempt to spawn naturally.

COMMENTS

- Since there is no infusion of new (naturally spawning) genetic material, there is no evidence that the program is actually integrated.
- This facility has more important programs to focus on.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG and will terminate the program beginning with the 2003 brood.

❖Stillaguamish/Snohomish

Overview

This region includes the watersheds contained by the Stillaguamish and Snohomish rivers and Tulalip Bay. For the purposes of this review, the Scientific Group and the regional managers divided the region into three sub-regions and then reviewed the hatchery programs involving each identified sub-regional salmonid stock (for example, North Fork Stillaguamish summer chinook). The review included a consideration of the program's effects on all other hatchery and naturally spawning sub-regional salmonid stocks. The sub-regions identified for this region include:

1. Stillaguamish River Watershed
2. Snohomish River Watershed
3. Tulalip Bay and Independent Tributaries

This chapter provides region-wide recommendations for the Stillaguamish/Snohomish region, a general overview of each sub-region, followed by reviews and recommendations for each salmonid stock that has an associated hatchery program.

FISHERIES

Chinook, coho and chum salmon harvest management in the Stillaguamish/Snohomish region is directed primarily towards the needs of natural production and secondarily for harvest of surplus hatchery production. Odd-year pink salmon harvest management is based on natural production; there is no hatchery production for pink salmon in this region. In addition to the normal odd-year pinks, the Snohomish supports an even-year run. Currently this population supports no directed fisheries. Winter steelhead harvest management is directed primarily towards the needs of natural production and secondarily for harvest of hatchery production. Summer steelhead harvest management is directed towards the needs of natural production and harvest of hatchery production. Sea-run cutthroat management is based entirely on natural production.

CONSERVATION

All Puget Sound chinook are currently managed under the *Puget Sound Comprehensive Chinook Management Plan: Harvest Management Component, March 23, 2001*. The intent of this plan is to maintain exploitation rates on natural chinook populations at or below levels that will allow them to rebuild as habitat conditions improve to allow greater production. Puget Sound coho salmon are currently managed under exploitation rate guidelines and escapement breakpoints being developed for the co-managers' *Comprehensive Coho Management Plan*. Natural origin chum salmon in the region have been managed for fixed escapement goals, with different goals set for odd- and even-year returns. Beginning with the 2000 management year, the management objectives were revised to add a harvest rate ceiling to these escapement goals. Odd-year pinks are managed so that the expected natural spawning escapement exceeds the goals for each of the rivers in the region. Even-year pink salmon are managed to allow the population to continue to expand. The goal of regional winter steelhead management is to consistently exceed the established escapement goal. The priority for regional summer steelhead is to place the needs of the naturally spawning fish first. Under the management strategy for sea-run cutthroat, minimum fish size limits were set so that the majority of

females (more than 50%) would be allowed to spawn at least once. Harvest under this scenario is allowed only where stocks are thought to be healthy and such harvest is consistent with management objectives.[61]

HABITAT

The geology of Stillaguamish basin is a complex combination of continental and alpine glacial material, and marine/non-marine interglacial deposits that have been influenced by volcanism, faulting and erosion. The upper North Fork Stillaguamish is dominated by Darrington Phyllite which is a metamorphic rock type that is particularly prone to erosion (a major problem in this watershed). Clay, silt and sand deposits of glacial and lake origin are the main source of significant sediment production in the watershed. In the steeper sloped areas, these deposits are particularly prone to landslides, which are a significant problem for salmonids living in this drainage. Over one third of the Stillaguamish watershed is in the rain-on-snow zone area (1,001–2,999 feet in elevation). As a result of the low elevation nature of this watershed and the extensive land use modifications, ten of the largest eleven annual peak flows on record occurred between 1980 and 1995.[62]

The future condition of habitat in this basin will depend primarily on social, political and economic factors, which are difficult to predict. Weather conditions will also influence habitat conditions. An optimistic forecast would assume that the general public and stakeholder groups would fully support salmon recovery goals and actions, and demand political action for implementation of recovery plans. There is reason to hope that we will be going down the optimistic road that will eventually lead to improved habitat quality, but that road will be slow and have lots of obstacles to overcome before we get to our destination. Ten years might not be long enough to see habitat improvement, but hopefully habitat improvement will not take much longer. In fifty years, the hope is the habitat will be in better shape than it is now.

Formal long-term habitat goals have not yet been established for the Stillaguamish Basin. The Stillaguamish Technical Advisory Group (STAG) published the Technical Assessment for Chinook Salmon Recovery in the Stillaguamish Watershed on July 12, 2000. This document contains three habitat recovery objectives for the Stillaguamish Watershed: 1) maintain and restore natural watershed processes; 2) maintain a dispersed and interconnected network of high quality habitat that addresses the needs of all life history stages of chinook; and 3) monitor and evaluate certain land use activities so that they can be adapted (where possible) to achieve specific objectives outlined in the document.

Long-term habitat goals for the Snohomish Basin are currently being developed. The *Initial Snohomish River Basin Chinook Salmon Conservation/Recovery Technical Work Plan* published October 6, 1999, by the Snohomish Basin Salmonid Recovery Technical Committee, recommends five habitat management concepts and principles that form the foundation of the work plan. These are: 1) emphasize protection and reconnection of habitat; 2) use historical information to guide today's decisions; 3) preserve and restore the natural ecosystem processes; 4) use monitoring and assessment to guide adaptive management; and 5) preserve options for the future.

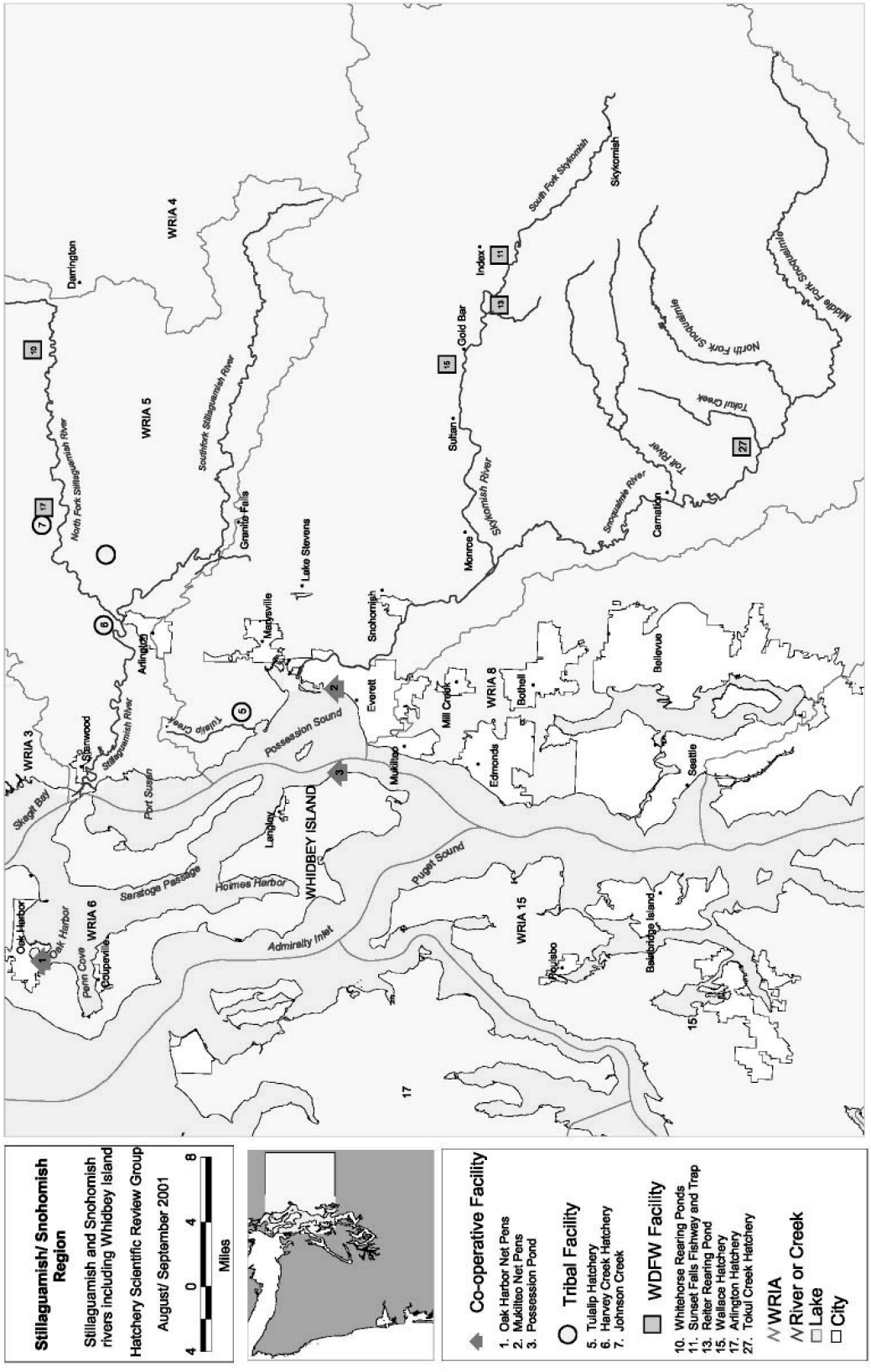
The work plan also identifies nine major habitat problems in the basin with recommended actions to address those problems. The Technical Committee has also produced the *Snohomish River Basin*

[61] *Kit Rawson, The Tulalip Tribes and Curt Kraemer, Washington State Department of Fish and Wildlife, September 2001.*

[62] *Kip Killebrew, Stillaguamish Tribe; includes citations of Thomas et al. 1997, 2496 Report, Perkins and Collins, 1997, STAG, 2000, and Collins, 1997.*

Chinook Salmon Habitat Evaluation Matrix. This report evaluated seven major habitat conditions within 62 sub-basins in the Snohomish Basin. Performance criteria and interim recovery goals were developed to establish three categories of habitat status: properly functioning, at risk, and not properly functioning. The Technical Committee is currently working on a similar project covering all salmonid species within the watershed. For chinook salmon, the habitat conditions in the majority of all sub-basins was considered to be at risk or not properly functioning.[63]

[63] *Mike Chamblin, Washington State Department of Fish and Wildlife, September 2001.*


Stillaguamish/ Snohomish Region
Stillaguamish and Snohomish rivers including Whidbey Island
Hatchery Scientific Review Group
August/ September 2001
4 0 4 8
Miles
Co-operative Facility
1. Oak Harbor Net Pens
2. Mukilteo Net Pens
3. Possession Pond
Tribal Facility
5. Tulalip Hatchery
6. Harvey Creek Hatchery
7. Johnson Creek
WDFW Facility
10. Whitehorse Rearing Ponds
11. Sunset Falls Fishway and Trap
13. Reiter Rearing Pond
15. Wallace Hatchery
17. Arlington Hatchery
27. Tokul Creek Hatchery
WRIA
River or Creek
Lake
City
WHIDBEY ISLAND
Possession Sound
Puget Sound
Admiralty Inlet
Saratoga Passage
Holmes Harbor
Port Susan
Skagit Bay
Oak Harbor
Penn Cove
Coupeville
Stanwood
Arlington
Marysville
Everett
Snohomish
Lake Stevens
Granite Falls
Darrington
Monroe
Sultan
Gold Bar
Index
Skykomish
Carnation
Duvall
Mukilteo
Mill Creek
Edmonds
Bothell
Bellevue
Seattle
Renton
Bainbridge Island
Langley
WRIA 3
WRIA 4
WRIA 5
WRIA 6
WRIA 8
WRIA 15
North Fork Stillaguamish River
Southfork Stillaguamish River
Stillaguamish River
Skykomish River
South Fork Skykomish
North Fork Snoqualmie
Middle Fork Snoqualmie
Tokul Creek
Tolt River
Snoqualmie River
Tulalip Creek

STILLAGUAMISH

Overview

STOCK STATUS[64]

Stocks	Hatchery Program?	Biological Significance (L= Low, M = Intermediate, H = High)			Population Viability (L= Critical, M = At Risk, H = Healthy)			Habitat (L = Inadequate, M = Limiting, H = Healthy)			Harvest Opportunity (0 = None, L = Occasional, M = Most years, H = Each year)		
			Goals			Goals			Goals			Goals	
		Now	Short-Term	Long-Term	Now	Short-Term	Long-Term	Now	Short-Term	Long-Term	Now	Short-Term	Long-Term
NF Stillaguamish Summer Chinook	Y	H	H	H	L/M	L/M	H	L	L	H	0	L	M
SF Stillaguamish Chinook	N	H	H	H	L	L	H	L	M	H	L	L	M
NF Stillaguamish Chum	Y	H	H	H	H	H	H	M	M	H	M	M	M
SF Stillaguamish Chum	Y	H	H	H	H	H	H	M	M	H	M	M	M
Stillaguamish Coho	Y	H	H	H	M	M	H	M	M	H	L	M	M
Deer Creek Stillaguamish Coho	N	H	H	H	L	M	H	L	M	H	L	L	M
NF Stillaguamish Pink	N	H	H	H	H	H	H	M	M	H	M	M	M
SF Stillaguamish Pink	N	H	H	H	H	H	H	M	M	H	M	M	M
NF Stillaguamish Hatchery Summer Steelhead	Y	L	L	L	L	L	L	L	L	L	H	H	H
NF Stillaguamish Deer Creek Summer Steelhead	N	H	H	H	M	M	H	L	M	H	0	L	M
SF Stillaguamish Hatchery Summer Steelhead	Y	L	L	M	L?	L?	L?	M	M	H	0	L	M
SF Stillaguamish Other Summer Steelhead	N	L	L	M	H	H	H	M	M	H	0	L	M
SF Stillaguamish Canyon Summer Steelhead	N	H	H	H	M	M	H	L	M	H	0	L	M
Stillaguamish Natural Winter Steelhead	N	H	H	H	M	M	H	M	M	H	L	M	M
Stillaguamish Hatchery Winter Steelhead	Y	L	L	L	L?	L?	L?	M	M	H	H	H	H
Stillaguamish Cutthroat	N	H	H	H	H	H	H	M	M	H	0	L	L
Stillaguamish Char	N	H	H	H	M	M	H	M	M	H	L	L	M

HABITAT

The Stillaguamish River drains an area of approximately 438,365 acres and includes more than 4,618 miles of streams and rivers. The river enters Puget Sound near the town of Stanwood, 16 miles north of Everett. This watershed includes more than 890 miles of anadromous stream habitat, just less than one-third of the total stream network. The headwaters are in the North Cascades, a topographically diverse area characterized by peaks and valleys carved by glacial activity. The South Fork Stillaguamish drainage begins at Three Fingers Peak (6,854 feet). Above the town of Silverton, the South Fork loses about 2,000 feet in elevation in three miles and then opens up to a valley floor. The river then flows 26 miles through this gradually widening valley, which is bordered by high mountains and ridges. Elevation drops 1,000 feet to the head of Robe Canyon, then another 600 feet in the eight miles to the mouth of Canyon Creek. Below Canyon Creek, the South Fork Stillaguamish flows an additional 12 miles northwesterly through a canyon and then over Granite Falls. The South Fork Stillaguamish continues an additional four miles through a narrow floodplain to its confluence with the North Fork.

[64] *This table contains ratings for all the salmonid stocks in the sub-region, as provided by the managers. For definitions of these ratings, see the* Components of This Report *section of the Introduction.*

The North Fork Stillaguamish headwaters form at an elevation of about 4,550 feet. The first 16 miles of the North Fork Stillaguamish, including the major tributaries of Squire, Boulder, French and Deer creeks, flows through narrow valleys with steep gradients. Near the present-day city of Darrington, the North Fork Stillaguamish emerges from the higher mountains and enters a wide valley characterized by braided channel, back channel sloughs, and ox-bow lakes. Its confluence with the South Fork Stillaguamish occurs at an elevation of 52 feet. The mainstem gradually slopes downward as it meanders through a wide floodplain to Port Susan.[65]

HATCHERIES

Whitehorse Ponds

Whitehorse Ponds are located 1.5 miles upstream of the mouth of Whitehorse Springs Creek, a tributary to the North Fork Stillaguamish River at river mile 28 from its confluence with the mainstem Stillaguamish River. The purpose of the facility is to produce winter and summer-run steelhead and rainbow trout for harvest. In addition, the facility works in cooperation with the Stillaguamish Tribe on a Stillaguamish summer chinook recovery program. The facility is closely linked with the WDFW Arlington Hatchery, on which it depends for incubation and initial rearing of steelhead and rainbow.[66]

Harvey Creek and Johnson Creek Hatcheries

The Stillaguamish Tribe's Harvey Creek Hatchery is located two miles upstream of the mouth of Harvey/Armstrong Creek, which is located 15.3 miles upstream of the mouth of the Stillaguamish mainstem. The Stillaguamish Tribe also has an acclimation pond located on Johnson Creek, which is a tributary of the North Fork Stillaguamish. The US Navy has a small hatchery located on Jim Creek, which is a tributary of the South Fork Stillaguamish. There are chinook, chum, steelhead and coho programs sited at these Stillaguamish Tribe hatcheries.[67]

Arlington Hatchery

The Arlington Hatchery was constructed by the WPA and started operating in 1939. It is located nine miles east of Arlington on Highway 530. It currently rears rainbow and cutthroat trout for inland recreational fisheries. In addition, it supports the winter and summer steelhead programs at Whitehorse Ponds, providing early rearing of these fish. Arlington Hatchery's major program is the hatching, rearing and planting of rainbow trout. The facility produces approximately 160,000 "legal" rainbow, 120,000 fingerling rainbow and 45,000 fingerling cutthroat trout. These fish are planted primarily in Snohomish and Island counties, but Skagit and King counties also get plants of these 8–13 inch rainbow trout.[68]

[65] *Mike Chamblin, Washington State Department of Fish and Wildlife, September 2001.*

[66] *Chuck Lavier, Washington State Department of Fish and Wildlife, September 2001.*

[67] *Kip Killebrew, Stillaguamish Tribe, September 2001.*

[68] *Darrell Mills, Washington State Department of Fish and Wildlife, September 2001.*

North Fork Stillaguamish Summer Chinook

Stillaguamish Tribe and Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	High	High	High
Population Viability	Critical/At Risk	Critical/At Risk	Healthy
Habitat	Inadequate	Inadequate	Healthy
Harvest Opportunity	None	Occasional	Most Years
Hatchery Program:			
Purpose	Conservation		
Type	Integrated		

PROGRAM DESCRIPTION

The North Fork Stillaguamish summer chinook stock derives from, and is maintained by, annual brood stock collection in the North Fork Stillaguamish River and adult returns to Whitehorse Hatchery. This program began in 1986 and is included in the Stillaguamish and Skagit Chinook GDU. This is an integrated conservation program with the goal of assisting with recovery of summer chinook salmon in the North Fork Stillaguamish River. To this end, 65 males and 65 females are collected for broodstock each year, and 220,000 smolts are released annually into the North Fork Stillaguamish River from Whitehorse Ponds. The long-term goal is to restore this population to a high level of viability so that it can support terminal fisheries in most years. This is a Pacific Salmon Treaty indicator stock.

OPERATIONAL CONSIDERATIONS

- The program attempts to achieve a natural origin recruit escapement of 700 fish for four consecutive years. If achieved, the managers will assess the ability of the natural population to rebuild itself without hatchery supplementation.
- Adult fish are collected for broodstock by small-mesh gill nets from the principal spawning areas of the North Fork of the Stillaguamish River. The proportion of natural-origin fish among the collected broodstock has ranged from 47.6% (1998) to 71.9% (1995) during the years 1993–98.
- Adult fish are spawned at the Harvey Creek Hatchery (HCH) in a five-by-five modified matrix.
- Fertilized eggs are incubated and hatched at the HCH, with initial rearing at Harvey Creek.
- Early rearing densities of juveniles at HCH exceed fish health guidelines.
- Pre-smolt juveniles are transferred to Whitehorse Ponds (WP) for tagging, acclimation and final rearing prior to release into the North Fork Stillaguamish River.
- Summer chinook pre-smolts are on reuse water at WP from ponds rearing steelhead. This is particularly a problem in low-flow, drought years.
- Summer chinook fingerlings at WP are transferred to ponds previously occupied by rainbow trout, but the gravel bottom of the pond precludes cleaning, drying, or disinfecting between transfers.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?

This program is consistent with short-term and long-term goals. The program appears to be reducing the risk of demographic extinction of summer chinook salmon in the North Fork Stillaguamish River. The demographic benefits of this program outweigh the risks. The greatest risk imposed by the program is the removal of natural-origin adults from their spawning areas. Recruits per spawner exceed 2.0 in most years, thus the program is conferring a net demographic benefit. The numbers of adults trapped in some years was lower than desired (11 and 44 females in 1995 and 1999, respectively), thus raising some concerns regarding a possible Ryman-Laikre[69] effect when the progeny representing those brood years returned and spawn naturally in the North Fork Stillaguamish.

B. Likelihood of attaining goals?

The program has a high likelihood of achieving its goals, particularly if pre-spawning mortality and disease transmission can be controlled, and potentially reduced, at HCH.

C. Consistent with goals for other stocks?

The program appears to be having little effect on other species in the Stillaguamish River.

RECOMMENDATIONS

- Improve existing facilities at Harvey Creek Hatchery and Whitehorse Ponds to increase likelihood of success for this conservation program.
- Consider ways to reduce the ten percent pre-spawning mortality of adults held at HCH.
- Develop a complete program to control pathogen transmission at HCH during adult spawning.
- Provide additional rearing space at HCH to reduce juvenile densities.
- Address water quality and quantity problems at WRP via program re-prioritization and/or additional water supply and/or plumbing redesign. Summer chinook, because of their high biological significance, should have top priority for water at Whitehorse. Consequently, conflicts for space and water between summer chinook and other stocks (e.g. steelhead, rainbow trout) should be resolved. This could include a dedicated final rearing and acclimation pond for summer chinook at Whitehorse that mimics natural rearing characteristics.
- Increase security measures at HCH and WP, including improved predator control. These issues are particularly important because of the high biological significance of the North Fork Stillaguamish summer chinook stock.
- Address long-term habitat improvement issues. The hatchery program will be successful only if the post-release environment is able to support the population.
- Monitor juvenile growth, distribution, post-release survival, and the length-frequency/age-class distributions of hatchery- and natural-origin fish constituting adult recruits.

COMMENTS

- The “critical” to “at risk” viability of this stock is related to poor habitat conditions associated with landslides, siltation and flooding.
- This is a valuable program that has the potential to provide very important long-term conservation benefits.

[69] *Ryman, N. and L. Laikre. 1991. Effects of supportive breeding on the genetically effective population size. Conservation Biology 5: 325-3329.*

- The five-by-five modified factorial mating design is appropriate, because this method has the indirect effect of maximizing the genetic effective number of breeders for a given number of male and female spawners.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG but notes that:

- Additional funding will be required to improve the existing facilities at Harvey Creek Hatchery and Whitehorse Rearing ponds.
- Number of fish released should be carefully reviewed to assure the objectives of the program are achieved.

The Stillaguamish Tribe generally agrees with the recommendations of the HSRG (the Tribe's full comments are appended to this document) and has taken the following steps:

- Beginning in 2002, all adult broodstock will be inoculated to help reduce pre-spawning mortalities.
- During 2002, grant proposals will be submitted to both the BIA (cyclical maintenance and rehabilitation) and NWIFC (hatchery reform) to make significant improvements to the existing spawning shed location and reduce disease transmission risks.
- Funding has been secured through the HSRG hatchery reform grant process to expand early rearing capacity at the Stillaguamish Tribe's Harvey Creek Hatchery. Additional early rearing capacity should be online by the fall of 2002.
- The co-managers are working diligently towards acquiring additional first pass water and improved plumbing for summer chinook reared at the WDFW Whitehorse Hatchery, with the goal of having additional water available by the spring of 2003.
- The rearing ponds at both hatcheries have had recent upgrades to their predator control equipment. The WDFW Whitehorse rearing pond will have an electronic counter installed to accurately enumerate releases and losses of summer chinook as the fish leave the pond. Should predator losses continue to be significant, additional measures will be taken to further reduce predator access to the acclimation pond.
- The Stillaguamish Technical Advisory Group and Stillaguamish Implementation and Review Group are developing specific habitat improvement objectives and habitat restoration projects needed to recover natural chinook productivity throughout the Stillaguamish watershed.
- The Stillaguamish Tribe and WDFW are implementing monitoring and evaluation programs that include coded wire tagging, morphometric analysis, smolt trap outmigration characterizations, extensive spawning ground surveys and genetic analysis.

North Fork Stillaguamish Chum

Stillaguamish Tribe

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	High	High	High
Population Viability	Healthy	Healthy	Healthy
Habitat	Limiting	Limiting	Healthy
Harvest Opportunity	Most Years	Most Years	Most Years
Hatchery Program:			
Purpose	Harvest		
Type	Integrated		

PROGRAM DESCRIPTION

The Stillaguamish North Fork chum stock (hatchery run) derives from brood stock collected primarily from Squire and Ashton creeks on the North Fork Stillaguamish, with some introductions from Jim Creek on the South Fork Stillaguamish. This program began in 1979. Throughout the 1980s, there were intermittent additions of wild-origin fish. By 1987, this hatchery program was self-sustaining. Currently, this stock is maintained by adults returning annually to Harvey Creek Hatchery, and by naturally spawning broodstock, every three to five years. This stock belongs to the North Puget Sound Fall Chum GDU. There are eleven other chum stocks in this GDU. The objective of the program is to provide fish for harvest while minimizing the genetic divergence of the hatchery stock from that of the naturally spawning stock. Additional hatchery program objectives identified include: 1) Increase harvest opportunity using a native derived stock; 2) dilute the harvest impact of pre-terminal fisheries on natural Stillaguamish River spawners; 3) provide a stable source of eggs and fry for reseeding under-used tributary habitat. To these ends, 650,000 fed fry (500,000 at Harvey Creek; 25,000 at Eagle Creek; 50,000 at Maxwelton Creek; 50,000 at Church Creek) are released into the mainstem and North Fork Stillaguamish. All eggs are collected and eyed at Harvey Creek. Eggs are hatched and the hatch reared at Harvey, Eagle, Maxwelton and Church creeks.

OPERATIONAL CONSIDERATIONS

- The program is designed to collect natural broodstock every three to five years, but this has not been accomplished since the inception of the program.
- The program has been limited by high rearing densities and water quality problems contributing to cold water disease, and environmental and bacterial gill disease.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?

The harvest benefit from this program appears to be minimal, with the program contributing less than two percent of the overall harvest for the Stillaguamish sub-region. There was no apparent contribution of this program toward diluting pre-terminal harvest of the Stillaguamish natural origin chum. There is also a potential genetic risk to North and South Fork Stillaguamish chum salmon

populations, considering the manner in which broodstock is collected for supplementation of natural stock (no yearly infusion of genes from naturally spawning stock).

B. Likelihood of attaining goals?
Given the current healthy status of the natural chum runs and the relatively small size of this program, the likelihood of achieving a significant harvest benefit is low. The likelihood of contributing to dilution of pre-terminal harvest, given current harvest management approaches, also appears low.

C. Consistent with goals for other stocks?
No negative effects were noted on goals for other natural stocks in the basin. There is a concern that, because of facility limitations, there is a significant risk of pathogen transmission between stocks of fish on-site. There is also a concern about using the Stillaguamish stock for supplementation of Maxwelton Creek on Whidbey Island. No information was provided about stock status or goals in this area. This program may well provide some benefits to artificial and natural coho and steelhead populations as a food source.

RECOMMENDATIONS

- Suspend this program because of minimal harvest benefits and healthy natural stocks.
- Develop a plan to reinstate the program should the natural stock status change for the worse.
- Modify several operational procedures in the event the program is restarted:
    - Change the approach to maintaining integration with the natural chum stock to incorporate naturally spawning broodstock each year.
    - Collect stocks used for supplementation from either the North or South Fork, depending on the location of the tributary planned for supplementation.
    - Develop facilities and procedures to reduce the risk of pathogen transmission between stocks of fish on-site.
    - Improve facilities to reduce early rearing densities.
- Review stock status and goals for the recipient watershed prior to continuing the use of Stillaguamish stock outside the Stillaguamish watershed.

COMMENTS

- In recent years, the natural chum stocks have been at or above escapement goals, with harvest ranging from 20,000–100,000 fish annually.
- WDFW and the Tribes have communicated their decision to modify the North Fork Stillaguamish chum program in a manner consistent with the above recommendations. The program will be converted from an integrated harvest to an educational program. The details of this change will be provided in the Managers Response.

MANAGERS RESPONSE

The Tribes and WDFW have agreed with the HSRG that the North Fork Stillaguamish chum program as outlined in October is not meeting its goals as an integrated harvest program and we have taken the following steps:

- Program size reduced to 200,000 fry and goal changed to an integrated education program.
- HSRG recommendations for broodstock collection and reduced rearing densities have been incorporated into the new program.

- During 2002, grant proposals will be submitted to both the BIA (cyclical maintenance and rehabilitation) and NWIFC (hatchery reform) to make significant improvements to the existing spawning shed location and reduce disease transmission risks.
- The co-managers will again evaluate the appropriateness of using Stillaguamish chum for the Maxwelton supplementation program and discontinue the program if the stock is not appropriate.

South Fork Stillaguamish Chum

Stillaguamish Tribe

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	High	High	High
Population Viability	Healthy	Healthy	Healthy
Habitat	Limiting	Limiting	Healthy
Harvest Opportunity	Most Years	Most Years	Most Years
Hatchery Program:			
Purpose	Harvest and Education		
Type	Integrated		

PROGRAM DESCRIPTION

The Stillaguamish South Fork chum stock (wild run) derives from brood stock captured in Jim and Siberia creeks in the South Fork of the Stillaguamish River. This program began in 1984 and is maintained by adult brood stock, primarily from Jim Creek Hatchery, with periodic introductions from the Stillaguamish Hatchery chum stock. This stock belongs to the North Puget Sound Fall Chum GDU. There are eleven other chum salmon stocks in this GDU. The objective of the program is to provide fish for harvest while minimizing the genetic divergence of the hatchery stock from that of the naturally spawning stock. To this end, 25,000 unfed fry are released from the Indian Ridge egg box. Eggs are collected and eyed at the Harvey Creek Hatchery.

OPERATIONAL CONSIDERATIONS

None.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The primary benefit of this program appears to be its educational value, given the healthy status of the stock.

B. Likelihood of attaining goals?
See comments in A, above, relating to program benefits.

C. Consistent with goals for other stocks?
In general, the program appears to be too small to have any adverse impacts, but many of the concerns noted for the North Fork program also apply, including stock choice and risk of pathogen transmission between stocks of fish at Harvey Creek Hatchery.

RECOMMENDATIONS

- Evaluate this program principally as an education program.

COMMENTS

- In recent years the natural chum stocks have been at or above escapement goals, with harvest ranging from 20,000–100,000 fish annually.
- WDFW and the Tribe have communicated their decision to modify this program to address the concerns in Benefits and Risks, Part C, above.

MANAGERS RESPONSE

The Stillaguamish Tribe generally agrees with the recommendations of the HSRG and has taken the following steps:

- We will return to broodstocking 100% of the chum needed for the program from Jim and Siberia creeks, which run immediately adjacent to the Indian Ridge facility and are tributaries of the South Fork Stillaguamish.
- The eggs will be incubated at the Harvey Creek hatchery and then returned to the facility egg box for hatching and release.
- During 2002, grant proposals will be submitted to both the BIA (cyclical maintenance and rehabilitation) and NWIFC (hatchery reform) to make significant improvements to the existing spawning shed location and reduce disease transmission risks.
- Funding has been secured through the hatchery reform grant process to expand early rearing capacity at the Stillaguamish Tribe's Harvey Creek Hatchery. Additional early rearing capacity should be on line by the fall of 2002.

Stillaguamish Coho

Stillaguamish Tribe

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	High	High	High
Population Viability	At Risk	At Risk	Healthy
Habitat	Limiting	Limiting	Healthy
Harvest Opportunity	Occasional	Most Years	Most Years
Hatchery Program:			
Purpose	Harvest and Conservation		
Type	Integrated		

PROGRAM DESCRIPTION

The Stillaguamish coho stock derives from hatchery and wild fish returning to Harvey and Jim creeks. This program began in 1986 and is maintained by adult returns to Harvey Creek Hatchery and Jim Creek. The Stillaguamish coho stock belongs to the Puget Sound/Strait of Georgia ESU. The objectives of the program are to provide fish for harvest and to aid in the recovery of the natural stock, while minimizing the genetic divergence of the hatchery stock from that of its naturally spawning counterparts. Eggs for both programs are collected, incubated, hatched and early-reared at Harvey Creek Hatchery. 25,000 yearlings are released from Johnson Creek Pond into the North Fork Stillaguamish or from Harvey Creek Hatchery into the mainstem. 20,000 yearlings are released from Jim Creek Hatchery into the South Fork Stillaguamish. This stock has been suggested as a candidate for use as an indicator stock for the Stillaguamish River.

OPERATIONAL CONSIDERATIONS

- Current broodstock collection methods involve mixing gametes from multiple stocks.
- The stock is tagged and marked.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
Conservation need and benefits are questionable under present operating conditions.

B. Likelihood of attaining goals?
Likelihood of achieving benefits in future could be increased with different broodstock selection methods, if the conservation need increased. The program is likely to meet modest harvest expectations.

C. Consistent with goals for other stocks?
The program appears to be consistent with goals for other stocks.

RECOMMENDATIONS

- Put the program on "standby" status, with a plan for how and when to restart if a conservation need is more clearly indicated.
- If the program is continued, increase the number of smolts released and introduce an average of 10% naturally spawning fish into the hatchery broodstock each year for on-station releases. Use a single source for broodstock and do not mix broodstock from multiple sub-stocks or drainages within the drainage.
- Evaluate whether an annual trapping and tagging operation on a naturally spawning stock would be less costly and more effective. There is some question about the efficiency of using this yearling smolt coho program as an indicator stock.
- Address long-term habitat improvement issues. The hatchery program will be successful only if the post-release environment is able to support the population.

COMMENTS

- The HSRG's preference is for the program to be placed on standby because the program is too small to provide a significant conservation or harvest benefit.
- WDFW and the Tribe have indicated that they will pursue a four-year program to assess the accuracy of using a naturally spawning stock as an indicator stock. However, this approach is not consistent with the above recommendation to trap and mark naturally-produced juveniles.

MANAGERS RESPONSE

Based on the recommendations of the HSRG, the Stillaguamish Tribe has taken the following steps to modify this program:

- Program goal has been modified from integrated recovery program to integrated harvest/recovery.
- HSRG recommendations regarding the size of the program, spawning protocols and broodstock source have been incorporated.
- Release location will be consistent with supporting sustainable fisheries.
- Program fish would be more representative of naturally spawning Stillaguamish coho than the current multi-generational hatchery stock.
- Program fish would be available to provide broodstock for reseeding under utilized or newly opened habitat.

North Fork Stillaguamish Hatchery Summer Steelhead

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[70]	Low	Low	Low
Habitat	Inadequate	Inadequate	Inadequate
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The South Fork Stillaguamish hatchery summer steelhead program derives from Skamania Hatchery (lower Columbia River) fish transplants. This program began in 1959 and has been maintained for the past 20 years from adult returns to Reiter Ponds (Skykomish drainage). The objective of this program is to provide for harvest, while avoiding adverse interactions with other local stocks. To this end, 70,000 yearlings are released from Whitehorse Ponds into the North Fork of the Stillaguamish River. Eggs are collected and eyed at Reiter Pond on the Skykomish River. Eggs are hatched and early reared at Arlington Hatchery.

OPERATIONAL CONSIDERATIONS

- Releases are marked.
- Program requires inter-facility transfers of eggs and fish.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The Program is operated in a manner consistent with goals.

B. Likelihood of attaining goals?
Uncertain, no data on harvest provided.

C. Consistent with goals for other stocks?
There are potential genetic interactions (outbreeding depression), predation, and competition with other steelhead stocks, particularly naturally spawning stocks. There are also disease risks, due to the rearing environment.

[70] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

RECOMMENDATIONS

- Implement Area-Wide Recommendations regarding establishing a regional system of "wild steelhead management zones" where streams are not planted with hatchery fish and are instead managed for native stocks. Fishing for steelhead in these zones would not be incompatible with this approach, but no hatchery-produced steelhead should be introduced. Such zones would reduce the risk of naturally spawning fish interbreeding with hatchery fish, and provide native stocks for future fisheries programs.
- Select streams to represent a balance of large and small streams, productivity, etc. Hatchery production may need to be increased in streams selected for hatchery harvest. The HSRG encourages the use of locally-adapted stocks for those streams.
- Minimize interaction with naturally spawning steelhead when implementing a segregated steelhead program through such tools as differential timing and a decision on benefits versus risks on outplanting in freshwater habitat. In addition, adult collection procedures should be designed to capture as many adults from the returning segregated population as possible.
- Organize a workshop to develop this concept.
- Include monitoring and evaluation as a basic component of the concept, for both wild steelhead management zones and hatchery harvest streams.
- Focus on water quality and quantity, improving smolt quality, considering aspects of environmental enhancement in rearing units.
- Increase water flows at the Whitehorse Ponds.
- Revise spawning procedures to include single-family mating or five-by-five matrix spawning.
- Release hatchery yearling steelhead smolts between May 1 and May 15, at a target size of six to the pound, and at a condition factor of less than 1.0.

COMMENTS

- Data concerning harvest benefits are lacking. WDFW values the fishing opportunity created by this program.

MANAGERS RESPONSE

WDFW generally supports the recommendations of the HSRG but notes that:

- Implementing a regional system of wild steelhead management zones has a number of implications that will require discussion with the affected tribes and the Fish and Wildlife Commission.
- Proposed spawning protocol may be difficult to implement because sperm is collected for virology tests.

The Tulalip Tribes generally support the recommendations of the HSRG (the Tribes' full comments are appended to this document), but have the following to add:

- The Tulalip Tribes will want to review the concept of wild steelhead management zones and the selection of particular zones before this concept is implemented.

South Fork Stillaguamish Hatchery Summer Steelhead

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Medium
Population Viability[71]	Low?	Low?	Low?
Habitat	Limiting	Limiting	Healthy
Harvest Opportunity	None	Occasional	Most Years
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The South Fork Stillaguamish hatchery summer steelhead program derives from Skamania Hatchery (lower Columbia River) fish transplants. This program began in 1959 and has been maintained for the past 20 years from adult returns to Reiter Ponds (Skykomish drainage). The objective of this program is to provide for harvest while avoiding any adverse interactions with other local stocks. To this end, 20-30,000 yearlings are out-planted from Reiter Ponds into the South Fork above Granite Falls, and 10,000 are outplanted into Canyon Creek. Eggs are collected and eyed at Reiter Pond on the Skykomish River. Eggs are hatched and early-reared at Arlington Hatchery.

OPERATIONAL CONSIDERATIONS

- Releases are marked.
- The program requires inter-facility transfers of eggs and fish.
- The program uses an HSRG-approved steelhead rearing and release process (hatchery yearling steelhead smolts are released between May 1 and May 15, at a target size of six to the pound, and have a condition factor of less than 1.0).

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The program is operated in a manner consistent with goals.

B. Likelihood of attaining goals?
Uncertain, no data on harvest provided.

[71] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

C. Consistent with goals for other stocks?
There are potential genetic interactions (outbreeding depression), predation, and competition with other steelhead stocks, particularly naturally spawning stocks. There are also disease risks, due to the rearing environment. There are particular concerns regarding the outplanting of hatchery fish in Canyon Creek.

RECOMMENDATIONS

- Implement Area-Wide Recommendations regarding establishing a regional system of "wild steelhead management zones" where streams are not planted with hatchery fish and are instead managed for native stocks. Fishing for steelhead in these zones would not be incompatible with this approach, but no hatchery-produced steelhead should be introduced. Such zones would reduce the risk of naturally spawning fish interbreeding with hatchery fish, and provide native stocks for future fisheries programs.
- Select streams to represent a balance of large and small streams, productivity, etc. Hatchery production may need to be increased in streams selected for hatchery harvest. The HSRG encourages the use of locally-adapted stocks for those streams.
- Minimize interaction with naturally spawning steelhead when implementing a segregated steelhead program through such tools as differential timing and a decision on benefits versus risks on outplanting in freshwater habitat. In addition, adult collection procedures should be designed to capture as many adults from the returning segregated population as possible.
- Organize a workshop to develop this concept.
- Include monitoring and evaluation as a basic component of the concept, for both wild steelhead management zones and hatchery harvest streams.
- Focus on water quality and quantity, improving smolt quality, considering aspects of environmental enhancement in rearing units.
- Increase water flows at the Whitehorse Ponds.
- Revise spawning procedures to include single-family mating or five-by-five matrix spawning.
- Consider alternative strategy focused on colonization of the upper watershed.

COMMENTS

- Data concerning harvest benefits are lacking. WDFW values the fishing opportunity created by this program.

MANAGERS RESPONSE

WDFW generally supports the recommendations of the HSRG but notes that:
- Implementing a regional system of wild steelhead management zones has a number of implications that will require discussion with the affected tribes and the Fish and Wildlife Commission.
- Additional funds will be required to increase water flows at Whitehorse Hatchery.
- Proposed spawning protocol may be difficult to implement because sperm is collected for virology tests.

The Tulalip Tribes generally support the recommendations of the HSRG (the Tribes' full comments are appended to this document), but have the following to add:
- The Tulalip Tribes will want to review the concept of wild steelhead management zones and the selection of particular zones before this concept is implemented.

Stillaguamish Hatchery Winter Steelhead

Washington Department of Fish and Wildlife and Stillaguamish Tribe

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[72]	Low?	Low?	Low?
Habitat	Limiting	Limiting	Healthy
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Stillaguamish hatchery winter steelhead program derives from transplants from South Tacoma Hatchery (Chambers Creek stock) in the 1960s. Since the 1980s, this stock has been maintained from returnees to Whitehorse Pond on the Stillaguamish River and supplemented with primarily Tokul Creek Hatchery (Snohomish drainage) or Reiter Pond winter steelhead (Skykomish drainage). The objective of this program is to provide for harvest, while avoiding any adverse interactions with other local stocks. To this end, eggs are collected and eyed at Whitehorse Ponds, and then hatched and early reared at Arlington Hatchery (for Whitehorse Ponds release) and Harvey Creek Hatchery (for Johnson Creek release). 130,000 yearlings (115,000 at Whitehorse Ponds, 15,000 at Johnson Creek Hatchery) are released into the North Fork Stillaguamish. Releases of up to 25,000 Snohomish River winter steelhead stock from Reiter Pond are outplanted into the Stillaguamish (Pilchuck Creek and Canyon Creek). 15,000 yearlings are released from the Masonic Park acclimation pond into the South Fork Stillaguamish.

OPERATIONAL CONSIDERATIONS

- All releases are marked.
- The program requires inter-facility transfers of eggs and fish.
- The program uses an HSRG-approved steelhead rearing and release process (hatchery yearling steelhead smolts are released between May 1 and May 15, at a target size of six to the pound, and have a condition factor of less than 1.0).

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The program is operated in a manner consistent with goals.

[72] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

B. Likelihood of attaining goals?
This program provides one of a few reliable harvest opportunities for tribal and sport fishers in the region. Harvest catch is low (<0.4%) relative to the size of the program, even though opportunity for harvest is high (60–70% of the winter run steelhead harvest).

C. Consistent with goals for other stocks?
There are potential genetic interactions (outbreeding depression), predation, and competition with other steelhead stocks, particularly naturally spawning stocks. There are also disease risks, due to the rearing environment.

RECOMMENDATIONS

- Implement Area-Wide Recommendations regarding establishing a regional system of "wild steelhead management zones" where streams are not planted with hatchery fish and are instead managed for native stocks. Fishing for steelhead in these zones would not be incompatible with this approach, but no hatchery-produced steelhead should be introduced. Such zones would reduce the risk of naturally spawning fish interbreeding with hatchery fish, and provide native stocks for future fisheries programs.
- Select streams to represent a balance of large and small streams, productivity, etc. Hatchery production may need to be increased in streams selected for hatchery harvest. The HSRG encourages the use of locally-adapted stocks for those streams.
- Minimize interaction with naturally spawning steelhead when implementing a segregated steelhead program through such tools as differential timing and a decision on benefits versus risks on outplanting in freshwater habitat. In addition, adult collection procedures should be designed to capture as many adults from the returning segregated population as possible.
- Organize a workshop to develop this concept.
- Include monitoring and evaluation as a basic component of the concept, for both wild steelhead management zones and hatchery harvest streams.
- Two potential wild steelhead management zones are above Granite Falls and Deer Creek.
- Focus on water quality and quantity, improving smolt quality, considering aspects of environmental enhancement in rearing units.
- Increase water flows at the Whitehorse Ponds.
- Revise spawning procedures to include single-family mating or five-by-five matrix spawning.
- Resize this program to reduce fish densities during early rearing until rearing conditions at the hatchery can be improved.
- Focus on smolt quality and eliminating disease problems to improve survival and better achieve harvest goals.

COMMENTS

None.

MANAGERS RESPONSE

WDFW generally supports the recommendations of the HSRG but notes that:

- Implementing a regional system of wild steelhead management zones has a number of implications that will require discussion with the affected tribes and the Fish and Wildlife Commission.
- Additional funds will be required to increase water flows at Whitehorse Hatchery.

- Implementing the proposed spawning protocol may be difficult because sperm is collected for virology tests.
- The portion of this winter run steelhead program conducted by the Stillaguamish Tribe has been officially terminated.

The Tulalip Tribes generally support the recommendations of the HSRG (the Tribes' full comments are appended to this document), but have the following to add:

- The Tulalip Tribes will want to review the concept of wild steelhead management zones and the selection of particular zones before this concept is implemented.

SNOHOMISH

Overview

STOCK STATUS[73]

Stocks	Hatchery Program?	Biological Significance (L=Low, M =Intermediate, H =High)			Population Viability (L=Critical, M = At Risk, H = Healthy)			Habitat (L = Inadequate, M = Limiting, H = Healthy)			Harvest Opportunity (0 = None, L = Occasional, M = Most years, H = Each year)		
		Now	Goals		Now	Goals		Now	Goals		Now	Goals	
			Short-Term	Long-Term		Short-Term	Long-Term		Short-Term	Long-Term		Short-Term	Long-Term
Snohomish/Snoqalmie Chinook	N	H	H	H	M	M	H	M	M	H	L	L	M
Snohomish/Skykomish Summer Chinook	Y	H	H	H	L/M	L/M	M	M	M	M	L	L	M
Snohomish Coho	N	H	H	H	M	H	H	M	M	M	M	M	M
Snohomish/Skykomish Hatchery Coho	Y	H	H	H	M	H	H	M	M	M	M	M	M
Snohomish/SF Skykomish Coho	N	M	M	M	H	H	H	M	M	H	M	M	M
Snohomish/Snoqalmie Coho	N	H	H	H	H	H	H	H	H	H	M	M	M
Snohomish Odd Pink	N	H	H	H	H	H	H	H	H	H	M	M	M
Snohomish Even Pink	N	H	H	H	H	H	H	M	M	H	0	L	M
Snohomish/Skykomish Fall Chum	N	H	H	H	H	H	H	H	H	H	M	M	M
Snohomish/Snoqualmie Fall Chum	N	H?	H	H	H?	H	H	M?	M	H	M	M	M
Snohomish/Wallace Fall Chum	N	H	H	H	H	H	H	H	H	H	M	M	M
Snohomish/Skykomish Winter Steelhead	N	H	H	H	H	H	H	M	M	H	L	M	M
Snohomish/Pilchuck Winter Steelhead	N	H	H	H	H	H	H	M	M	H	L	M	M
Snohomish/Snoqualmie Winter Steelhead	N	H	H	H	H	H	H	M	M	H	L	M	M
Snohomish Hatchery Winter Steelhead	Y	L	L	L	L?	L?	L?	M	M	H	H	H	H
Snohomish/Tolt Summer Steelhead	N	H	H	H	H	H	H	M	M	H	0	L	L
Snohomish/NF Skykomish Summer Steelhead	N	H	H	H	M	M	H	M	M	H	0	L	L
Snohomish/SF Skykomish Summer Steelhead	N	M	M	M	H	H	H	M	M	H	0	L	L
Snohomish Hatchery Summer Steelhead	Y	L	L	L	L?	L?	L?	M	M	H	H	H	H
Snohomish Cutthroat	N	H	H	H	H	H	H	M	H	H	M	M	M
Snohomish Char	N	H	H	H	H	H	H	M	M	H	M	M	M

HABITAT

The Snohomish River basin drains a 1,780 square mile area and is the second largest watershed draining into Puget Sound. The basin has three distinct physiographic regions: the Skykomish River Basin, the Snoqualmie River Basin and the Snohomish River Valley. Over 1,730 tributary rivers and streams have been identified in the basin, providing over 2,718 linear miles of drainage.

The South Fork Skykomish River originates near the summit of Stevens Pass and flows west and northwest some 32 miles through mountainous terrain, to its confluence with the North Fork Skykomish near the town of Index. The Beckler, Foss and Miller Rivers, Money and Index creeks are some of the larger tributaries of the South Fork. The mainstem Skykomish River continues generally west for about 30 miles, to its junction with the Snoqualmie River. From the Skykomish Forks downstream for about six miles, the channel is confined, with a relatively steep gradient. From the

[73] *This table contains ratings for all salmonid stocks in the sub-region, as provided by the managers. For definitions of these ratings, see the* Components of This Report *section of the Introduction.*

vicinity of Gold Bar downstream to Sultan, the channel widens and the gradient decreases, forming numerous gravel bars and side channels in this braided reach. Major tributaries of this section include the Wallace and Sultan rivers. Downstream from Sultan, the river meanders some 14 miles through a wide floodplain with a moderate to gentle gradient, where it meets the Snoqualmie River to form the Snohomish River. Woods, Elwell and McCoy creeks are the larger tributaries in this section.

The Snoqualmie River originates in the high cascades and consists of three forks; the South, Middle and North Forks. Approximately five miles above Snoqualmie Falls, the combined North and Middle Fork have their confluence with the South Fork. From Snoqualmie Falls, plunging 268 feet, the Snoqualmie River travels 36 miles northwest through a broad and flat valley to the confluence of the Skykomish River. The Tolt and Raging rivers, Tokul, Patterson, Griffin, Harris, and Cherry creeks are main tributaries to the Snoqualmie River.

The mainstem Snohomish River meanders 20.5 miles through a broad valley floor, where it enters Puget Sound at Everett. The Pilchuck River is the largest tributary, entering the river at the town of Snohomish. Three major sloughs—Ebey, Union and Steamboat—diverge from the main Snohomish channel in the lower eight miles. The Snohomish River is tidally influenced upstream to about river mile 14.[74]

HATCHERIES

Wallace River Hatchery

The Wallace River Hatchery is located between the confluence of May Creek and the Wallace River, near the town of Startup. The hatchery was originally known as the Skykomish Hatchery and dates back to 1907. It is the only hatchery facility rearing chinook within the Snohomish River Basin. The Wallace River Hatchery rears both summer chinook, for local release, and fall chinook in support of the Tumwater Falls program (see South Sound, Deschutes River sub-region). Both of these programs are harvest-oriented. During the 1970s, three chum salmon spawning channels were installed at this hatchery. Sediment and disease issues eventually caused the channels to fail as spawning and initial-rearing habitat. They were asphalted and converted into rearing ponds, which remain in use today. The 1980s saw the construction of a bank of concrete raceways, a bank of standard ponds, and an adult trapping facility on the Wallace River side of the hatchery. The hatchery incubates and rears Reiter Ponds summer steelhead production from the time the eggs are eyed until the fish reach a size of 70 fish per pound, at which time they are transferred back to Reiter Ponds for final rearing. In addition, Wallace River Hatchery receives winter steelhead fingerlings from Tokul Creek Hatchery, at 150 fish per pound that are eventually destined for Reiter Ponds. These fish are transferred to Reiter Ponds at the same time as summer steelhead, usually in October when the fish are approximately 70 fish per pound.

Reiter Ponds Hatchery

The Reiter Ponds Hatchery is located on the main stem of the Skykomish River at river mile 46, just east of the town of Gold Bar. Original construction took place in 1973–74 and included the rearing ponds, migrant fish traps and residence. Additional construction in 1988 included an incubation building, adult holding pond and fish ladder. The purpose of the facility is to provide winter- and summer-run steelhead for harvest. The operation of the hatchery is closely linked to WDFW's Wallace River and Tokul Creek hatcheries, because Reiter Ponds is limited in its ability to incubate

[74] *Mike Chamblin, Washington State Department of Fish and Wildlife, September 2001.*

eggs, having only eight shallow troughs and no intermediate starting ponds. Typically, eggs are eyed at Reiter Ponds and then shipped to either Tokul Creek Hatchery (if winter-run eggs are taken) or Wallace River Hatchery (summer-run) for final incubation and initial fry rearing. The fish then return to Reiter Ponds in the fall (October) for final rearing and spring release.

Tokul Creek Hatchery

Tokul Creek Hatchery is situated 2.5 miles east of Fall City and 2.5 miles west of the town of Snoqualmie. The hatchery is adjacent to Tokul Creek, a tributary of the Snoqualmie River. Tokul Creek enters the Snoqualmie River immediately below Snoqualmie Falls, the upper limit for anadromous salmonids. Tokul Creek Hatchery is a harvest-oriented facility that produces winter-run steelhead and various trout species for the local fisheries. The facility was constructed in the early 1900s.[75]

[75] *Doug Hatfield, Washington State Department of Fish and Wildlife, September 2001.*

Snohomish/Skykomish Summer Chinook

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	High	High	High
Population Viability	Critical/At Risk	Critical/At Risk	At Risk
Habitat	Limiting	Limiting	Limiting
Harvest Opportunity	Occasional	Occasional	Most Years
Hatchery Program:			
Purpose	Harvest		
Type	Integrated		

PROGRAM DESCRIPTION

The Snohomish/Skykomish summer chinook stock derives from wild fish collected at Sunset Falls on the Skykomish River in the early 1970s. This stock is maintained by adult returns to Wallace River Hatchery (on the Wallace River, a tributary to the Skykomish River). The Snohomish/Skykomish summer chinook stock belongs to the South Puget Sound, Hood Canal, and Snohomish Summer+Fall GDU. This GDU is composed of multiple stocks from throughout Puget Sound and Hood Canal. This program's objectives include providing for harvest, while avoiding adverse interactions with other stocks in the watershed. A second objective is to provide 200,000 eyed summer chinook eggs annually to the Tulalip summer chinook program. To this end, one million fingerlings and 250,000 yearlings are released annually into the Wallace River. The eggs are incubated at the Wallace River Hatchery and the resulting progeny are reared at and released from the hatchery as fingerlings and yearlings. This stock is an indicator stock for Puget Sound summer chinook.

OPERATIONAL CONSIDERATIONS

- Broodstock used is native to the Skykomish River.
- Fingerling and yearling releases mimic the life history strategies exhibited by naturally spawning Skykomish summer chinook.
- Releases are non–volitional.
- Fingerlings are double-index tagged, consistent with the role of a US/Canada indicator stock (200,000 fingerlings receive a coded-wire tag and adipose clip; another 200,000 receive only a coded-wire tag).
- Adults surplus to program needs are allowed to spawn naturally in the Wallace River, or used for other purposes.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?

The program is generally consistent with the goals for the stock. However, current broodstock management creates a risk of domestication.

B. Likelihood of attaining goals?
The program is meeting its goals by providing modest but important harvest in pre-terminal and terminal fisheries. It is useful as an indicator stock for summer chinook and is successfully providing eyed eggs for Tulalip Hatchery.

C. Consistent with goals for other stocks?
Evidence indicates that the program results in minimal interaction with Snoqualmie fall chinook, but straying into the Skykomish River may have an adverse effect on Bridal Veil and Sultan River chinook stocks.

RECOMMENDATIONS

- Improve broodstock management to ensure that the hatchery stock remains truly integrated with the naturally spawning stock. Introduce an average of 10% naturally spawning fish into the hatchery broodstock each year for on-station releases. Sunset Falls currently appears to be the best choice for this broodstock source.
- Use a spawning protocol involving single pair matings or five-by-five matrix matings to maximize the effective population size.
- Consider environmental enhancement to improve the adult return rate.
- Eliminate the rearing of fall chinook for the Deschutes program in South Sound, in coordination with changes proposed for southern Puget Sound region (program contravenes existing policy on fish transfers between fish health management zones).
- Eliminate the rearing of steelhead in river water at Wallace River Hatchery as soon as possible (losses, particularly with summer steelhead, are unacceptably high).
- Consider providing ground water for incubation and early rearing at Wallace River Hatchery.
- Upgrade rearing ponds at Wallace River Hatchery to permit volitional releases.
- Upgrade the broodstock collection facility to facilitate sorting of naturally spawning and hatchery adults at Wallace River Hatchery.
- Upgrade the pollution abatement facility at Wallace River Hatchery.

COMMENTS

- Better integration of the hatchery summer chinook population with its naturally spawning counterparts will mean that hatchery strays will pose a reduced risk to natural chinook populations in the Skykomish River (e.g., Bridal Veil and Sultan Creek populations).
- Elimination of fall chinook and steelhead rearing at Wallace River Hatchery should allow available hatchery facilities and staff to be used more effectively on remaining programs, or may permit other needed programs to be conducted at the hatchery.
- Upgrading facilities at the hatchery will provide for future flexibility.
- If and when the Tulalip program is switched to summer chinook, this program will provide 1.5 million eggs annually for that program.

MANAGERS RESPONSE

WDFW generally supports the recommendations and has taken the following actions:
- Reduced by 40% the rearing of fall chinook for the Deschutes program in South Sound.
- Prioritized upgrading the pollution abatement facility.

WDFW notes that:

- Identification of the number of naturally origin spawners incorporated in the hatchery broodstock is a complex topic that will require additional analysis and discussion;
- Additional funding will be required to upgrade the facilities as recommended.

Snohomish/Skykomish Hatchery Coho

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	High	High	High
Population Viability[76]	Medium	High	High
Habitat	Limiting	Limiting	Limiting
Harvest Opportunity	Most Years	Most Years	Most Years
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Snohomish/Skykomish hatchery coho program derives from wild fish trapped in the lower Snohomish basin, with supplementation from the Wallace River Hatchery (on the Wallace River, a tributary to the Skykomish River). The stock has been maintained from returnees to the Wallace River Hatchery on the Skykomish River since the early 1900s. The goal of this program is segregated harvest augmentation. A secondary goal is to provide a tagged index stock for assessment of regional contribution to distant (Canadian) fisheries. To this end, 4.3 million eggs are collected. Smolts sufficient to sustain broodstock at Wallace River Hatchery are released. Harvest augmentation at Tulalip Bay and at South Sound is supported. Tulalip Tribal Hatchery receives 1.3 million eggs annually for fishery augmentation program at Tulalip Bay. Marblemount Hatchery receives 1.7 million annually for South Sound harvest augmentation. The South Sound Net Pens receive 400,000 yearling coho annually for harvest augmentation. Other small programs are also supported, in addition to 150,000 smolt releases at Wallace.

OPERATIONAL CONSIDERATIONS

- The surplus hatchery production is provided for harvest in Tulalip Bay and in the South Sound, in isolation from harvest of naturally spawning stock.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?

This program is consistent with goals and objectives. The conservation risks posed by this program to naturally-spawning salmon in the region are relatively small. Evidence from spawning ground surveys in which marked fish were counted and from surveys in which scales were collected (allowing discernment from pattern analysis of hatchery-origin fish) suggests that straying outside the Wallace River is relatively small and that inter-crossing with naturally spawning-spawning coho is minimal. In addition, the size of the program is small relative to the size of the stock.

[76] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

B. Likelihood of attaining goals?
Historical success suggests strong likelihood of meeting objectives.

C. Consistent with goals for other stocks?
Transfers of this stock to South Sound programs are not consistent with conservation goals, as Skykomish coho are not locally adapted to the South Sound.

RECOMMENDATIONS

- Maintain a large effective population size in the Skykomish coho broodstock. The rationale for this recommendation includes: 1) the sustained protection of the productivity of the Skykomish coho program; and 2) amelioration of any risk posed by inter-crossing of program coho with naturally spawning coho in the basin. Gametes taken for support of the broodstock, for release at Wallace, should be a representative sample of the entire return and include equal representation of 500 or more spawners.
- Consider converting this program from a segregated to an integrated program, to address concerns about natural spawning.

COMMENTS

None.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG.

Snohomish Hatchery Winter Steelhead

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[77]	Low?	Low?	Low?
Habitat	Limiting	Limiting	Healthy
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Snohomish hatchery winter steelhead stock derives from Chambers Creek origin winter steelhead that came from Tokul Creek Hatchery (Snohomish drainage) and Reiter Ponds (Skykomish drainage) around the time of World War II. This stock has been maintained from adult returns to Tokul Creek Hatchery and Whitehorse Pond on the Stillaguamish River since the late 1970s. The purpose of this three-faceted program is to provide for harvest, while avoiding adverse interactions with other stocks in the watershed. To this end:

1. 270,000 yearlings are released into the Skykomish River (80–110,000 at Reiter Ponds, 20,000 at Wallace River Hatchery, and the remainder at various other Skykomish River release sites). Eggs for this purpose are collected from adults returning to Tokul Creek Hatchery, where they are also incubated and the hatch early reared. Wallace River Hatchery provides intermediate and final rearing for the group released into Wallace River and intermediate rearing for the group released from Reiter Ponds.
2. 185,000 yearlings are released into the Snohomish basin (80-90,000 from Tokul Creek Hatchery and the remainder from various other release sites). Eggs for this purpose are collected and incubated at Tokul Creek Hatchery, where the resulting progeny are reared until release.
3. 15,000 yearlings are released into the Pilchuck River. Eggs for this purpose are collected and eyed at Whitehorse Ponds, hatched and early reared at Arlington Hatchery, then reared to release at Whitehorse Ponds.

OPERATIONAL CONSIDERATIONS

- Released fish are marked.
- Returning adults surplus to broodstock needs are forced to remain in the river at Tokul Creek and Reiter Ponds, to provide for sports fishing.

[77] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

- Early spawn timing of the hatchery stock minimizes genetic interaction with naturally spawning winter steelhead.
- The program requires inter-facility transfers of eggs and fish.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The program is being operated in a manner consistent with its short- and long-term goals. It is providing for valuable harvest. Interbreeding of the hatchery stock with the naturally spawning stock is minimized by the differences in spawn timing.

B. Likelihood of attaining goals?
There is a strong likelihood that program goals will continue to be met, although recent trends in adult returns have shown an unexplained decline.

C. Consistent with goals for other stocks?
There is the potential for genetic interaction with naturally spawning winter steelhead, but this is likely to be insignificant for the reason stated in A, above.

RECOMMENDATIONS

- Implement Area-Wide Recommendations regarding establishing a regional system of "wild steelhead management zones" where streams are not planted with hatchery fish and are instead managed for native stocks. Fishing for steelhead in these zones would not be incompatible with this approach, but no hatchery-produced steelhead should be introduced. Such zones would reduce the risk of naturally spawning fish interbreeding with hatchery fish, and provide native stocks for future fisheries programs.
- Select streams to represent a balance of large and small streams, productivity, etc. Hatchery production may need to be increased in streams selected for hatchery harvest. The HSRG encourages the use of locally-adapted stocks for those streams.
- Minimize interaction with naturally spawning steelhead when implementing a segregated steelhead program through such tools as differential timing and a decision on benefits versus risks on outplanting in freshwater habitat. In addition, adult collection procedures should be designed to capture as many adults from the returning segregated population as possible.
- Organize a workshop to develop this concept.
- Include monitoring and evaluation as a basic component of the concept, for both wild steelhead management zones and hatchery harvest streams.
- Manage the hatchery stock to maintain its current spawn timing.
- Revise the spawning protocol to use single pair matings or five-by-five matings, to help ensure an effective-size spawning population.
- Release hatchery yearling steelhead smolts between May 1 and May 15, at a target size of six to the pound, and a condition factor of less than 1.0.
- Continue to use the weir at Tokul Creek Hatchery to trap all salmonids and transport naturally spawning salmonids above the weir, so that these fish can take advantage of existing spawning habitat (an exception to the upstream transport would be naturally spawning salmonids deemed by the managers to pose an unacceptable risk to fish stocks held at Tokul Creek hatchery).
- Obtain an additional one cubic foot per second of spring water at Tokul Creek Hatchery for incubation and early rearing.

- Expand the Reiter Ponds facility to provide for incubation and early rearing of winter and summer steelhead, so that the need for rearing at Wallace River Hatchery is eliminated.

COMMENTS

- Reasons for the decline in adult winter steelhead returns should be investigated if this decline continues.
- Establishment of wild steelhead management zones should reduce the chances of ecological and genetic interactions with hatchery steelhead and help to ensure the availability of founding stocks for hatchery purposes should the need for such stocks arise.
- Upgrade the water supply at Tokul Creek Hatchery and expand rearing capabilities at Reiter Ponds, for more efficient production of steelhead.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG but notes that:

- Implementing the proposed spawning protocol may be difficult because sperm is collected for virology tests.
- Additional funding will be required to upgrade the facilities as recommended.
- Implementing a regional system of wild steelhead management zones has a number of implications that will require discussion with the affected tribes and the Fish and Wildlife Commission.

The Tulalip Tribes generally support the recommendations of the HSRG (the Tribes' full comments are appended to this document), but have the following to add:

- The Tulalip Tribes will want to review the concept of wild steelhead management zones and the selection of particular zones before this concept is implemented.

Snohomish Hatchery Summer Steelhead

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[78]	Low?	Low?	Low?
Habitat	Limiting	Limiting	Healthy
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Snohomish hatchery summer steelhead stock derives from Reiter Ponds (Skamania origin) along with an unknown contribution of indigenous stock. This program began in 1974. Since the 1980s, this stock has been maintained from adult returns to Reiter Ponds (on the Skykomish River). The purpose of this program is to provide for harvest, while avoiding adverse interactions with other stocks in the watershed. To this end, 250,000 yearlings are released annually into the Skykomish River (80–110,000 at Reiter Ponds, the remainder at various other release sites along the Skykomish River). The eggs are incubated at Wallace River Hatchery, and the resulting progeny early reared there. Final rearing and release are at Reiter Ponds.

OPERATIONAL CONSIDERATIONS

- Yearlings are marked prior to release.
- Adults surplus to broodstock needs are forced to remain in the river to provide a recreational fishery.
- Spawn timing of the hatchery stock overlaps that of naturally spawning summer steelhead, but the overlap is apparently decreasing because of current hatchery broodstock collection practices.
- Interactions with naturally spawning summer steelhead are minimized by releasing hatchery fish in the mainstem, well downstream of areas in the basin typically used by naturally spawning summer steelhead.
- Properly timed hatchery releases appear to be vacating the basin rapidly (within a week of release).
- The program requires inter-facility transfers of eggs and fish.

[78] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The program is being operated in a manner consistent with short- and long-term goals. It is providing a high contribution to harvest, and precautions mentioned above are being taken to minimize interactions with naturally spawning summer steelhead.

B. Likelihood of attaining goals?
There is a strong likelihood that the program will continue to meet its goals. Its contributions to harvest show no tendency to decline and spawn timing overlaps with naturally spawning summer steelhead have been substantially reduced.

C. Consistent with goals for other stocks?
The program appears to be operating in a manner consistent with the goals for other stocks.

RECOMMENDATIONS

- Implement Area-Wide Recommendations regarding establishing a regional system of "wild steelhead management zones" where streams are not planted with hatchery fish and are instead managed for native stocks. Fishing for steelhead in these zones would not be incompatible with this approach, but no hatchery-produced steelhead should be introduced. Such zones would reduce the risk of naturally spawning fish interbreeding with hatchery fish, and provide native stocks for future fisheries programs.
- Select streams to represent a balance of large and small streams, productivity, etc. Hatchery production may need to be increased in streams selected for hatchery harvest. The HSRG encourages the use of locally-adapted stocks for those streams.
- Minimize interaction with naturally spawning steelhead when implementing a segregated steelhead program through such tools as differential timing and a decision on benefits versus risks on outplanting in freshwater habitat. In addition, adult collection procedures should be designed to capture as many adults from the returning segregated population as possible.
- Organize a workshop to develop this concept.
- Include monitoring and evaluation as a basic component of the concept, for both wild steelhead management zones and hatchery harvest streams.
- Maintain current broodstock collection practice, as it will help to further reduce overlaps in spawn timing with naturally spawning summer steelhead.
- Revise the spawning protocol to use single pair matings or five-by-five matings, to help ensure an effective-size spawning population.
- Release hatchery yearling steelhead smolts between May 1 and May 15, at a target size of six to the pound, and a condition factor of less than 1.0.
- Continue to use the weir at Tokul Creek Hatchery to trap all salmonids and transport naturally spawning salmonids above the weir, so that these fish can take advantage of existing spawning habitat (an exception to the upstream transport would be naturally spawning salmonids deemed by the managers to pose an unacceptable risk to fish stocks held at Tokul Creek hatchery).
- Obtain an additional one cubic foot per second of spring water at Tokul Creek Hatchery for incubation and early rearing.
- Expand the Reiter Ponds facility to provide for incubation and early rearing of winter and summer steelhead, so that the need for rearing at Wallace River Hatchery is eliminated.
- Upgrade facilities for spawning and handling of adult steelhead.

- Provide improved predator control at rearing ponds.

COMMENTS

- Currently, summer steelhead broodstock collection at Reiter Ponds uses only the first 500 fish that return, a procedure that likely accounts for the decreasing overlap in spawn timing with that of naturally spawning summer steelhead.
- Establishment of the wild steelhead management zones should reduce the chances of ecological and genetic interactions with hatchery steelhead and should help to ensure the availability of founding stocks for hatchery purposes should the need for such stocks arise.
- Upgrading facilities at Reiter Ponds should result in more efficient production of steelhead.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG but notes that:

- Implementing the proposed spawning protocol may be difficult because sperm is collected for virology tests.
- Additional funding will be required to upgrade the facilities as recommended.
- Implementing a regional system of wild steelhead management zones has a number of implications that will require discussion with the affected tribes and the Fish and Wildlife Commission.

The Tulalip Tribes generally support the recommendations of the HSRG (the Tribes' full comments are appended to this document), but have the following to add:

- The Tulalip Tribes will want to review the concept of wild steelhead management zones and the selection of particular zones before this concept is implemented.

TULALIP BAY AND INDEPENDENT TRIBUTARIES

Overview

STOCK STATUS[79]

Stocks	Hatchery Program?	Biological Significance (L=Low, M =Intermediate, H =High)			Population Viability (L=Critical, M = At Risk, H = Healthy)			Habitat (L = Inadequate, M = Limiting, H = Healthy)			Harvest Opportunity (0 = None, L = Occasional, M = Most years, H = Each year)		
		Now	Goals		Now	Goals		Now	Goals		Now	Goals	
			Short-Term	Long-Term		Short-Term	Long-Term		Short-Term	Long-Term		Short-Term	Long-Term
Tulalip Bay Hatchery Spring Chinook	Y	L	L	L	L	L	L	L	L	L	H	H	H
Tulalip Bay Hatchery Summer Chinook	Y	L	L	L	L	L	L	L	L	L	H	H	H
Tulalip Bay Hatchery Fall Chinook	Y	L	L	L	L	L	L	L	L	L	H	H	H
Tulalip Bay hatchery Coho	Y	L	L	L	L	L	L	L	L	L	H	H	H
Tulalip Bay Hatchery Chum	Y	L	L	L	L	L	L	L	L	L	H	H	H
Other Cutthroat	N	H	H	H	L	L	L	L	M	M	0	0	L
Other Hatchery Coho	Y	L	L	L	L	L	L	L	L	L	H	H	H

HABITAT

No information provided.

HATCHERIES

Tulalip Bay (Bernie Kai-Kai Gobin) Hatchery

The Tulalip (Bernie Gobin) Salmon Hatchery is located at the north end of Tony's Marsh on the Tulalip Indian Reservation, near the point where the East and West forks of Tulalip Creek meet. The pond is created by a large dam near Tulalip Bay and is several acres in size. It drains to Tulalip Bay via the lower facility pond and a series of valves, raceways, pipes and a fish ladder. The hatchery rears and releases spring, summer and fall chinook, as well as coho and chum to provide commercial and ceremonial opportunity for tribal members. The hatchery also provides commercial and recreational opportunity in non-Indian fisheries.

Everett Net Pens

Community volunteers, in cooperation with WDFW, operate a marine coho net pen in the City of Everett to provide recreational fishing opportunity and to keep the local community engaged in state and regional fishery matters.[80]

[79] *This table contains ratings for all salmonid stocks in the sub-region, as provided by the managers. For definitions of these ratings, see the* Components of This Report *section of the Introduction.*

[80] *Darrell Mills, Washington State Department of Fish and Wildlife, September 2001.*

Tulalip Bay Hatchery Spring Chinook

Tulalip Tribes

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[81]	Low	Low	Low
Habitat	Inadequate	Inadequate	Inadequate
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Tulalip Bay hatchery spring chinook program relied on annual outplants from adult returns to the Marblemount Hatchery (on the Skagit River). This stock originates from the Sauk River tributary (on the Skagit River). This program began with brood year 1993 and was suspended in brood year 1999. The purpose of the program was to provide for harvest while avoiding adverse interactions with other local stocks. To this end. 40,000 yearlings were released at Bernie Kai-Kai Gobin Salmon Hatchery into Tulalip Bay. Eggs were collected and eyed at Marblemount Hatchery. Eggs were hatched, and the hatch reared and released at the Bernie Kai-Kai Gobin Salmon Hatchery.

OPERATIONAL CONSIDERATIONS

- Tulalip Bay has no habitat for natural salmon production. It is strictly a terminal area for harvest of hatchery produced salmon.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
This program is consistent with the goals.

B. Likelihood of attaining goals?
The likelihood of attaining goals is low, since Tulalip Bay facilities currently lack rearing space and sufficient cold water to rear spring chinook successfully.

C. Consistent with goals for other stocks?
This program may affect other stocks through genetic or ecological interactions.

[81] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

RECOMMENDATIONS

- Determine whether returns from the summer chinook program are sufficient to meet the ceremonial purposes. If not, facilities at Tulalip Bay must be upgraded to provide appropriate rearing conditions for spring chinook.

COMMENTS

None.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG.

The Tulalip Tribes support the recommendations of the HSRG.

Tulalip Bay Hatchery Summer Chinook

Tulalip Tribes and Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[82]	Low	Low	Low
Habitat	Inadequate	Inadequate	Inadequate
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Tulalip Bay hatchery summer chinook program relies on annual outplants from adult returns to the Wallace River Hatchery on the Skykomish River. This stock originates from the Skykomish River. The Tulalip Bay hatchery summer chinook program is a two generation trial to determine if program goals can be met by switching from fall to summer chinook and basing the program on an in-region stock. The summer chinook salmon program began in brood year 1998. The purpose of this program is to provide for harvest, while avoiding adverse interactions with other local stocks. To this end, 200,000 eggs are obtained from the integrated broodstock program at the Wallace River Hatchery. Incubation, rearing and release as sub-yearlings occur at the Bernie Kai-Kai Gobin Salmon Hatchery.

OPERATIONAL CONSIDERATIONS

- Tulalip Bay has no habitat for natural salmon production. It is strictly a terminal area for harvest of hatchery produced salmon.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
B. Likelihood of attaining goals?
C. Consistent with goals for other stocks?

As this is a new program, harvest benefits and potential straying risks cannot yet be evaluated. The most significant potential risk is the effect of introgression of hatchery strays on the distinct and relatively small naturally spawning Snoqualmie fall chinook population. The opportunity for non-treaty harvest could be increased through adipose fin clip mass marking.

[82] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

RECOMMENDATIONS

- Design studies that evaluate different approaches to manage potential straying problems, while proceeding with the evaluation of the summer chinook program. Such approaches might include (but not be limited to): reducing straying to areas other than the Skykomish, for example, by incubating and initial rearing of Tulalip bound fish at Wallace, and/or through the use of morpholine drip at Tulalip and at Skykomish to improve homing to these destinations. It is also possible that habitat in the Snoqualmie is unsuitable for the summer chinook life history pattern and/or that separation in spawning timing and location prohibits introgression with Snoqualmie fall chinook. Evaluation of the current program should continue, so that more information about the magnitude and consequences of straying can be obtained.
- Include adipose fin clip mass marking to help this program achieve the goal of maximizing harvest rate and to assess straying.
- Implement a Skykomish brood stock program consistent with the goals of the Snohomish summer chinook population. Introduce an average of 10% naturally spawning fish into the hatchery broodstock each year for on-station releases.

COMMENTS

- The HSRG commends the managers in this region for recognizing the potential risks due to straying and for conducting well designed studies to evaluate them.

MANAGERS RESPONSE

The Tulalip Tribes generally support the recommendations of the HSRG (the Tribes' full comments are appended to this document), but have the following to add:

- The co-managers believe that the otolith mark is the only type of mass mark suitable for assessing straying when the simultaneous contribution of several different hatchery stocks to natural spawning areas is of interest and the hatchery stocks must therefore receive a unique mark.
- During the period of feasibility testing for the suitability of the summer chinook stock for rearing at Tulalip, 100,000 fish per year are receiving a coded wire tag and adipose fin clip. During this period, the co-managers believe the otolith mark is the only mass mark this group should receive, not additional adipose fin clips.
- If and when the summer chinook become the broodstock of choice at Tulalip Hatchery, then the co-managers believe it would be appropriate to discuss whether to mass mark all or part of the production with an adipose fin clip.

WDFW generally supports the recommendations and notes that:

- Identification of the number of naturally origin spawners incorporated in the hatchery broodstock is a complex topic that will require additional analysis and discussion.

Tulalip Bay Hatchery Fall Chinook

Tulalip Tribes and Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[83]	Low	Low	Low
Habitat	Inadequate	Inadequate	Inadequate
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Tulalip Bay hatchery fall chinook program relied on annual outplants from adult returns to the Wallace River Hatchery on the Skykomish River. This stock originates from Green River. Currently this program is supported by Green River-origin fish returning to Samish Hatchery on the Samish River and from adults returning to Wallace River Hatchery after August 15. This program began in the mid-1970s.The purpose of this program is to provide for harvest while avoiding adverse interactions with other local stocks. To this end, the program releases 1.5 million fingerlings annually into Tulalip Bay. Eggs are eyed, hatched, and the hatch reared and released at Bernie Kai-Kai Gobin Salmon Hatchery.

OPERATIONAL CONSIDERATIONS

- Tulalip Bay has no habitat for natural salmon production. It is strictly a terminal area for harvest of hatchery produced salmon.
- Since the fall chinook program at Wallace is discontinued, this source of brood stock is no longer available.
- The agreement between the co-managers states that if not enough eggs can be collected at Wallace, eggs will come from another Green River stock.
- Skykomish summer chinook is also being studied as a possible alternative brood for this program.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
This program is consistent with the goals for this stock.

[83] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

B. Likelihood of attaining goals?
The program has provided reliable harvest opportunities each year. The Tulalip Bay fall chinook program has provided valued harvest opportunities in particular by providing access to harvestable hatchery fish when other marine fisheries must remain closed to protect depressed natural populations. The opportunity for non-treaty harvest opportunity could be increased through adipose fin clip mass marking.

C. Consistent with goals for other stocks?
The primary concern with this program is the straying of fall chinook that escape fisheries in Tulalip Bay (and elsewhere) and migrate into the Snohomish River. Preliminary study results suggest that straying into the Snoqualmie River may be significant. The Snoqualmie fall chinook is a genetically distinct population which, although relatively stable, is of low enough abundance to warrant concern about the rate of contribution of hatchery fish to the spawning population.

RECOMMENDATIONS

- Consider summer chinook as a substitute for out-of-basin-origin fall chinook as a brood stock choice for this program.
- Reduce or suspend the program pending the outcome of the ongoing straying study, to avoid potential impacts on the Snoqualmie fall chinook population.
- Include adipose fin clip mass marking, to help this program achieve the goal of maximizing harvest rate and to assess straying.

COMMENTS

- The managers in this region are commended for recognizing the potential risks due to straying, for conducting well designed studies to evaluate these risks, and for developing potential alternative programs.

MANAGERS RESPONSE

The Tulalip Tribes generally support the recommendations of the HSRG (the Tribes' full comments are appended to this document), but have the following to add:

- During the period of feasibility testing for the suitability of the summer chinook stock for rearing at Tulalip, 100,000 fall chinook per year are receiving a coded wire tag and adipose fin clip. During this period, the co-managers believe the otolith mark is the only mark this group should receive, not additional adipose fin clips.
- The co-managers believe that the program should continue at current levels until such time as data from the summer chinook evaluation indicates otherwise. Some mixture of summers and falls may be used to achieve program goals in the interim, based on discussions and agreement between the Tulalip Tribes and WDFW.

WDFW generally supports the recommendations and notes that:

- The co-managers believe that the program should continue at current levels until such time as data from the summer chinook evaluation indicates otherwise. Some mixture of summers and falls may be used to achieve program goals in the interim, based on discussions and agreement between the Tulalip Tribes and WDFW.

Tulalip Bay Hatchery Coho

Tulalip Tribes

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[84]	Low	Low	Low
Habitat	Inadequate	Inadequate	Inadequate
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Tulalip Bay hatchery coho program relies on annual outplants from adult returns to the Wallace River Hatchery (on the Skykomish River). This stock originates from the Skykomish River. This program began in the mid 1970s. The purpose of this program is to provide for harvest while avoiding adverse interactions with other local stocks. To this end, the program releases one million yearling smolts each year into Tulalip Bay, where returning adults are harvested at the highest possible rate. Incubation, rearing and release occur at the Bernie Kai-Kai Gobin Salmon Hatchery.

OPERATIONAL CONSIDERATIONS

- Tulalip Bay has no habitat for natural salmon production. It is strictly a terminal area for harvest of hatchery produced salmon.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
This program is consistent with harvest goals.

B. Likelihood of attaining goals?
The program has provided harvest opportunities each year and is likely to continue to do so. The opportunity for non-treaty harvest opportunity could be increased through adipose fin clip mass marking.

C. Consistent with goals for other stocks?
Information about straying is sparse, however even with a moderate straying rate, the contribution of Tulalip hatchery coho to naturally spawning escapement would be small, due to the low abundance of hatchery fish relative to the natural escapement.

[84] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

RECOMMENDATIONS

- Investigate the contribution of hatchery fish to natural spawning.
- Manage the brood stock maintenance program at Wallace River Hatchery consistent with the goals for the Skykomish coho population.
- Consider integrating naturally spawning fish into the brood stock.
- Include adipose fin clip mass marking to help this program achieve the goal of maximizing harvest rate and to assess straying.
- Design and implement a study to assess the contribution of hatchery fish to natural spawning populations.

COMMENTS

None.

MANAGERS RESPONSE

The Tulalip Tribes generally support the recommendations of the HSRG (the Tribes' full comments are appended to this document), but have the following to add:

- This program currently includes coded wire tags and adipose fin clips on 50,000 smolts per year and mass marking of an additional 250,000–300,000 smolts per year with adipose fin clips subject to agreement between Tulalip and WDFW.

WDFW generally supports the recommendations and notes that:

- Identification of the number of naturally origin spawners incorporated in the hatchery broodstock is a complex topic that will require additional analysis and discussion.

Tulalip Bay Hatchery Chum

Tulalip Tribes

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[85]	Low	Low	Low
Habitat	Inadequate	Inadequate	Inadequate
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Tulalip Bay hatchery chum stock derives from Quilcene Hatchery plants (Walcott Slough stock on Hood Canal) from 1975–78. This stock was genetically marked through selective breeding of individuals with particular allelic genotypes, resulting in progeny with elevated frequencies of rare genotypes. Genotypic marking took place over a complete generation cycle and was completed in the mid 1990s. This stock is maintained by genetically marked adult returns to Tulalip Hatchery on Tulalip Creek. The purpose of this program is to provide for harvest while avoiding adverse interactions with other local stocks. To this end, eggs are incubated, hatched, reared and released at Bernie Kai-Kai Gobin Salmon Hatchery. The annual egg take goal is eight million, with a release goal of 7.5 million smolts.

OPERATIONAL CONSIDERATIONS

- Tulalip Bay has no habitat for natural salmon production. It is strictly a terminal area for harvest of hatchery produced salmon.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
This program is consistent with harvest goals.

B. Likelihood of attaining goals?
This program meets its goals with no apparent adverse impact, although evaluation of straying into natural populations should continue so that this potential risk can be properly managed.

C. Consistent with goals for other stocks?
The Tulalip chum population is genetically mass marked. Study results so far indicate no significant straying of these fish into the Stillaguamish or Snohomish basins.

[85] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

RECOMMENDATIONS

- Resume allozyme genetic analysis for this program for the purpose of monitoring contribution of hatchery fish to harvest (i.e. monitoring benefits), and naturally spawning populations (potential effects on naturally spawning stocks).

COMMENTS

- This is an example of a successful program that meets its goals, while effectively managing potential risks.
- The managers in this region are commended for recognizing the potential risks due to straying and for conducting well designed studies to evaluate them.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG. No response yet received from the Tulalip Tribes.

The Tulalip Tribes support the recommendations of the HSRG.

Other Hatchery Coho

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[86]	Low	Low	Low
Habitat	Inadequate	Inadequate	Inadequate
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Other hatchery coho program is used for a cooperative project and relies on annual outplants from Wallace River Hatchery on the Skykomish River. This stock originates from the Skykomish River. The purpose of this program is to provide for harvest while avoiding adverse interactions with other local stocks. To this end, 70,000 yearlings are released into Puget Sound (50,000 at Possession Point; 20,000 at Port Gardner Bay, Snohomish River mouth). Eggs are collected and incubated at Wallace River Hatchery, where they are reared prior to final rearing and release into saltwater.

OPERATIONAL CONSIDERATIONS

- The net pen consists of one deep net pen where coho are acclimated, reared and released. Smolts are transferred from the Wallace River Hatchery.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
This program is consistent with the goals.

B. Likelihood of attaining goals?
Continued harvest opportunity is expected from this program. There is also an education benefit.

C. Consistent with goals for other stocks?
Straying from net pens can pose genetic risks to adjacent native stocks. However, there is a low risk here because of the source of the broodstock, the relatively small release numbers, and the viability or health of the adjacent native population to which straying may occur.

[86] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

RECOMMENDATIONS

- Do not significantly increase release numbers.

COMMENTS

None.

MANAGERS RESPONSE

WDFW supports the recommendation of the HSRG.

❖Appendices

Appendix A: Jamestown S'Klallam Tribe Full Comments

Jamestown S'Klallam Tribe Responses to HSRG Report

My comments are provided with the two stated goals of hatchery reform in mind:

- Help recover and conserve naturally spawning populations
- Support sustainable fisheries

Comments offered here are limited to the recommendations provided for Dungeness Chinook, Dungeness Hatchery Coho, Dungeness Fall Pink and Dungeness Hatchery Winter Steelhead.

I would like to emphasize that many of the recommendations listed by the HSRG are those that the co-managers have been discussing for years. There are also new and interesting recommendations from the HSRG that we are anxious to attempt and implement. However, resources necessary to accomplish these recommendations are scarce. We welcome the support of and partnership with the HSRG in our attempts to reform the hatchery programs in the Eastern Straits region.

<u>Dungeness Chinook</u>

The HSRG recommends that studies be initiated to understand the freshwater life history patterns of resident chinook. By resident we assume the HSRG means the natural, locally adapted chinook population of the Dungeness River. Studies such as these were initiated in 1997 and our understanding of freshwater life history has improved. Much more work is needed. Downstream migration of chinook through the lower river must be sampled on a regular basis beginning as early as April and extending into the fall months. This can be accomplished by a passive sampling apparatus such as a rotary trap or by active sampling means such as seining. The river reach under tidal influence and the Bay must also be regularly sampled. A

long-term commitment both in terms of effort and funding is required for this study.

Hatchery release strategies must be evaluated through analysis of coded wire tag data as it becomes available. July and August releases of zero age chinook do not seem to contribute well to adult returns. With increasing returns to the river in 2001, it may be somewhat premature to discount a given release strategy until available coded wire tag data has been analyzed.

Yearling chinook releases will be evaluated with coded wire tagging studies beginning this year. Early indications are that this rearing strategy will significantly increase the release to return rates of Dungeness chinook.

A recovery plan that moves managers beyond the captive broodstock program is needed. Efforts to develop this plan will begin this year.

Plans to develop well water sources for Dungeness Hatchery are underway. Should adequate quantities of ground water be found, incubation and early rearing conditions at Dungeness Hatchery can be greatly improved.

Related to the acquisition of adequate well water is Canyon Creek, the existing secondary water supply for Dungeness Hatchery. Should the Department of Fish and Wildlife find adequate water and funding to utilize ground water as an alternative to Canyon Creek, restoration efforts should immediately begin. The water intake dam should be removed in a manner that maximizes restoration opportunity both upstream and downstream of the structure. Stream channel and riparian restoration projects should be planned, funded and accomplished as soon as practical. A restored Canyon Creek represents a major tributary habitat in the Dungeness River system, particularly for natural production of coho, steelhead and cutthroat.

Opening the Dungeness River side channel across from the Hatchery poses some major questions from a river hydrology and channel stability point of view. This issue needs the attention of experts in the field before pursuing a main river channel alteration.

<u>Dungeness Hatchery Coho</u>

Dungeness Bay and the Dungeness River have been home to Indian salmon fisheries for thousands of years. S'Klallam village sites have historically been located on the shore of the Bay because of the rich diversity of fish and

shellfish resources. The Dungeness Bay hatchery coho fishery is the last remaining commercial salmon fishery with Jamestown S'Klallam Tribal member participation. One of two goals for the hatchery reform effort is to find ways of supporting sustainable fisheries. This fishery is of great importance to the Jamestown S'Klallam Tribe and deserves the support of the HSRG.

Little is know about the status of natural coho in the Dungeness River system. While the life history of coho in general and of the regional populations in particular is fairly well understood, the Dungeness River system has been so greatly altered that the population's response to the lack of quality spawning habitat, limited summer rearing area and treacherous over-wintering conditions is not understood. A straightforward estimate of coho production from the Dungeness is needed along with an accurate estimate of the annual spawning population size. This can be accomplished through spawning surveys and with smolt tagging or marking and some of the same lower river sampling projects needed for studies of juvenile chinook migration.

Concerns about the effect of large number of hatchery coho smolts being released into the system are valid. The life history studies needed for chinook can be adapted to monitor the migration of hatchery coho through the lower river, to ensure the rapid migration that is intended is occurring. More importantly, managers need to learn what the hatchery coho do when they reach the estuary. Seining operations can be an effective means of monitoring fish communities in the near-shore environment of Dungeness Bay.

Evaluating whether the hatchery coho program could become an integrated program depends heavily on managers understanding more about the natural population, what the population size is, how productive the stock is, what the limits to production are in the basin, and whether adequate broodstock could be obtained on an annual basis.

Efforts to assess the spawning activity of coho salmon in the basin, where they spawn, what the origin of spawners is, whether hatchery coho spawners disturb chinook and/or pink salmon redds and displace natural coho spawners, have begun. This is particularly true in years of high marine survival when coho returns number in the tens of thousands and a significant portion of the hatchery run bypasses the Hatchery and spawns in the wild.

Dungeness Fall Pink

Assessing risks of producing fall pink salmon in the hatchery is appropriate. However, an assessment will undoubtedly show the habitat these fish utilize for spawning is highly unstable. Given the preferences for spawning habitat these fish exhibit there is little opportunity for production improvement or perhaps continued existence of the stock without some degree of intervention and the use of salmon culture technology. Perhaps this is where the assessment effort would be most valuable.

In 2001, analytical tools used in the genetic separation of summer and fall pink salmon broodstock improved measurably. Different marking and tagging methods of cultured fish are being considered for possible use with Dungeness fall pinks. The co-managers are continually seeking improvements with these and other methods and techniques.

Dungeness Hatchery Winter Steelhead

Wild steelhead management zones may be attempted in this and other regions. The size of the region and the quantity of hatchery fish released should be evaluated carefully given the propensity of hatchery origin steelhead to stray. Also, management jurisdictions must be given consideration with this approach. One of the goals of the reform effort is to support sustainable fisheries. Some Tribes, whose local river system may become designated as a wild production system, may lose a sustainable winter fishery and may not have fishing access to those rivers where hatchery production would more often provide that sustained fishery.

A prescribed release time and size may or not be appropriate for some hatchery steelhead stocks. Perhaps an analysis of available size and time of release data would be in order. Regional differences may exist in what is thought to be optimal release or migration timing.

Much more than removing the dam, a restored Canyon Creek likely represents some of the best tributary spawning habitat in the basin for coho, steelhead and cutthroat.

As with coho and chinook, were Dungeness Hatchery able to use ground water of sufficient quantity and quality in place of the existing surface water

from Canyon Creek, all aspects of egg incubation and initial rearing would become much more manageable.

Appendix B: Nisqually Tribe Full Comments

MEMORANDUM

TO: HSRG Members

FROM: David A. Troutt, Natural Resources Director

DATE: January 16, 2002

RE: Comment on the Final Report of the HSRG

I have carefully reviewed the draft Final Report of the Puget Sound and Coastal Washington Hatchery Reform Project and would like to provide both general and specific comments. These comments are intended to be constructive and maintain the separation, and therefore integrity, of the independent scientific review and closely related policy decisions needed to implement the suggested changes.

I would like to compliment the HSRG for the excellent product represented in this draft report. From organization to detailing specific recommendations, this report is well thought out and should find use amongst a number of audiences. Considering the technical nature of the subject, you have done an excellent job in presenting the information in a way that will find broad acceptance and appeal. Given the importance of this project and the focus hatcheries have been subject to over the recent past, it is only through an open, honest, and scientifically credible review of our current practices will we make significant progress toward recovery in these dynamic ecosystems; and, equally important, acceptance in the turbulent court of public opinion.

One of our goals in this report should be to avoid crossing that somewhat gray area between science and policy that has lead to the criticism of efforts like this in the past (i.e. NMFS and its Salmon Recovery Science Review Panel). I have reviewed this document with this intent in mind, but you should also consider this objective in your final deliberations over this report. Nothing will spell the end of a scientific endeavor faster than a trespass into policy.

On to specific comments:

Page 6, Egg-Take Timing. The HSRG should recommend consideration of removing policy constraints to promote the desired outcome.

Chambers Bay Fall chinook section – We concur with the recommendations

Garrision chum – we concur with the analysis and further recommend discontinuing the program.

The level of priority given to pink protection in the Nisqually should be complimented by actions taken outside of the basin. Mention should be given to protection strategies throughout their life cycle. Finally, the determination of a high priority is clearly a policy call. We need this report to reflect the risk of our current strategy and call for a change, not determine the ranking of this concern versus other concerns.

Recommendations on McAllister – Whether we agree or not with this notion, how the property is dealt with and where the potential proceeds are spent is clearly a policy decision and should be removed from this document.

I hope that these suggestions are found useful and productive as we move on to the next phase in this project. Thanks again for your hard work and commitment to this project and to the improved management and recovery of salmon in this region.

Appendix C: Squaxin Island Tribe Full Comments

Squaxin Island Tribe
Comments on HSRG Recommendations for South Puget Sound Region
January 7, 2002

Deschutes River Hatchery Fall Chinook

Recommendation 1: Obtain a Memorandum of Understanding (MOU) from NMFS addressing potential Endangered Species Act status of Chinook spawning naturally above Tumwater Falls, prior to implementing the long-term plans described below.

The Tribe is strongly supportive of this recommendation. We have continually raised this issue with the State, and together we have approached NMFS in the past to address this issue. To date we have not been successful in getting NMFS to establish a formal position on the issue. Hopefully with this recommendation we can renew our efforts.

Recommendation 2: Develop long-term plans for rearing and release facilities that eliminate the need for out-of-basin transfers. This requires investment in new facilities in the Deschutes River basin.

The Tribe is supportive of this recommendation. We are working closely with the State and their consultant to develop a programmatic approach and Master Plan proposal for facilities that would provide for all life history stage rearing within the basin.

Recommendation 3: Implement a transitional, in-region program that restricts fish and egg transfers, to be consistent with the co-managers disease policy. Consider incubation at Minter Creek and rearing at Coulter Creek as part of this transitional program.

The Tribe is supportive of this goal while recognizing that there are short-term obstacles to overcome. While there is certainly opportunity in reprogramming the Coulter Creek facility for this purpose now that on-station release of Chinook has been discontinued there, it is unlikely that this change alone can accommodate the full range of production. We are committed to investigating a full range of interim alternatives while moving expeditiously toward implementation of a new, in-basin facility.

Recommendation 4: Develop rearing and release locations that eliminate all net pen operations in Percival Cove.

The Tribe is supportive of this recommendation and has advocated such in the Capital Lake Adaptive Management Steering Committee.

Recommendation 5: Provide adequate water and pond space to allow fish to grow and be released at the optimal time and size for maximum survival advantage.

With the development of the new facility plan for the Deschutes, the Tribe has the expectation that it will accommodate optimal production strategies for the Chinook program.

Recommendation 6: Develop appropriate pollution abatement or rearing strategies to meet local, state and federal clean water requirements.

It is the Tribe's expectation that the new facility will be state-of-the art in terms of treating and reusing available water resources. It will be our goal to exceed all relevant water quality standards and statutes.

Recommendation 7: Develop a strong educational component involving local partnerships, given the location of the drainage within a major urban area, the state Capitol and the City of Tumwater.

The Tribe is working closely with the State, the City of Tumwater, Trout Unlimited, and other local partners to achieve a positive climate for supporting the development of a new facility that maximizes the opportunity for public education.

Squaxin / South Sound Net Pens Hatchery Coho

Recommendation 1: Quantify the amount of straying from South Sound Net Pens to South Sound Coho tributaries.

The Tribe is involved with several efforts that are aimed, at least in part, at further clarification of Net Pen Coho contribution to naturally spawning coho production. We have conducted adult trapping programs on three local coho tributaries and are continuing this effort on one of these where an adult trap is practical to maintain without flooding over a complete spawning season. All fish are marked and increasing numbers will be coded wire tagged such that spawning assessments will be better able to detect hatchery fish presence on the spawning grounds. The Tribal fishery is being intensively sampled including scale analysis to ascertain the hatchery and wild composition of the commercial catch. Consistent efforts at these types of studies will be necessary to achieve a dependable level of quantification.

Recommendation 2: Compare the genetic and life history characteristics among South Sound, Skykomish and Minter Creek coho populations.

A better understanding of any existing distinctions between these coho stocks is warranted. Due to decades of out planting using Minter Creek fish, it is unclear if there exists any distinct South Sound stock that is different from Minter Creek. Coho are notoriously hard to determine distinct genetic characteristics between stocks. Still, life history attributes deserve more detailed attention and should also include performance characteristics regarding the production setting,

especially considering the concerns expressed by the HSRG about survival rates. There also exists CWT data from different stocks utilized in the past, which can be analyzed to further evaluate contribution to the programs intended goals.

Recommendation 3: Compare rates of straying between in-region and out-of-region incubation and rearing.

Examination of these rearing strategies is currently underway. Fish reared at Minter Creek and transferred directly to the net pens will be compared with similar fish reared at Wallace and transferred directly to the pens. Additionally, we will be examining groups of different brood origin (Minter Creek and Skykomish) that are reared under identical strategies and conditions.

Recommendation 4: During these evaluations, relocate incubation and rearing within the region, to the extent that space exists at regional facilities.

The Squaxin Island Tribe remains concerned about the effect of this recommendation. We have strong reservations that this proposal does not fully consider the intent of the program. While we support the intent to minimize fish transfers, and the effects from straying, we believe it is premature to follow this recommendation without further examination of its outcomes. Our contention that out of basin rearing actually helps to reduce straying should be considered in light of additional information. Even so, it may be possible to reduce transfers and the basins impacted by improving infrastructure at a central location. It is our position that this recommendation would clearly benefit from additional discussion. We will certainly pursue this discussion within the co-manager Core Group proposed below, and would also like to suggest that the HSRG reserve some time to revisit this issue in the future when there is better information available upon which to base a recommendation.

Recommendation 5: Evaluate benefits and risks of using Skykomish stock versus a within-region stock, probably Minter Creek hatchery.

The Tribe and the State are currently undertaking this evaluation with a direct comparison of performance of these two stocks in the production setting. Brood from both facilities will be reared simultaneously at the same facilities throughout their rearing history and will be evaluated by means of CWTs recovered from adults in the fishery, at the hatcheries, and recovered on the spawning grounds. In addition, the management issues implicit in the broodstock discussion will be evaluated in a workgroup proposed as an extension of the Comprehensive Coho process. This Core Group will allow the co-managers to fully discuss all the management implications including in addition to the enhancement issues presented in the HSFG report, harvest management issues relating to terminal and pre-terminal fisheries, habitat protection, supplementation and restoration efforts incumbent in projects like the Goldsborough Creek dam removal, and ecosystem loading concerns (also identified by the HSRG).

Recommendation 6: During these evaluations, change the broodstock source for this program to a local broodstock.

The co-managers are already in partial compliance with this recommendation as the 2001 brood will be approximately one half Minter Creek broodstock. In order to maintain the validity of the comparison between broods, this regime will be maintained for a minimum of three years. There is also a risk in shifting to the Minter Creek stock too abruptly, that there may not be sufficient brood stock available to supply the additional egg take needs. Minter Creek is within an area that is managed for hatchery production; therefore the harvest level is higher than the Skykomish system, which is managed for natural production. The management regime at Skykomish assures a surplus of hatchery fish available at broodstock, while Minter Creek can be influenced by the harvest regime. Two years ago Minter Creek barely had enough escapement to supply its on-station needs, even with additional fishery restrictions implemented. This is a consideration that must be built into management plans to assure there are enough adults returning to Minter Creek to supply the enhancement goals.

Recommendation 7: Develop a long-term strategy based on the results of the analyses described above and other relevant information.

As noted above, the regional co-managers will convene a workgroup under the auspices of Comprehensive Coho to further elucidate the management issues for southern Puget Sound coho and develop a comprehensive approach for harvest, habitat and hatchery issues. This Core Group will work in an integrated fashion to address regional issues and will include the best-informed and most involved scientists in developing the management strategy.

Recommendation 8: Do not increase the size of the program beyond the current level of 1.8 million fish, at least during the period when survival is depressed for many stocks possessing a yearling life history strategy.

It is the intention of the co-managers to maintain the current reduced production level until we can develop a better evaluation of the survival depression observed in recent years. To that end, we are participating in the development of a trophic level model (ECOPATH) of southern Puget Sound in an attempt to determine whether any regime shifts have altered productivity of this region. We are currently pursuing funding to assess the residency period and survival of coho smolts in South Sound once they are released from the net pens. This information will also be useful in calibration of the trophic production model.

Appendix D: Stillaguamish Tribe Full Comments

Suggested Changes, Recommendations and Responses to the Draft HSRG Regional Review

Stillaguamish North Fork Summer Chinook Manager's Response

Recent fish health information has documented elevated pre-spawning mortalities in male chinook broodstock as being caused by BKD. Beginning in 2002, all adult broodstock will be inoculated to help reduce prespawning mortalities.

During 2002 grant proposals will be submitted to both the BIA (cyclical maintenance and rehab) and NWIFC (hatchery reform) to make significant improvements to the existing spawning shed location and disease transmission risks.

Funding has been secured through the HSRG hatchery reform grant process to expand early rearing capacity at the Stillaguamish Tribe's Harvey Creek hatchery. Additional early rearing capacity should be on line by the fall of 2002.

The co-managers are working diligently towards acquiring additional first pass water and improved plumbing for summer chinook reared at the WDFW Whitehorse hatchery with the goal of having additional water available by the spring of 2003.

The rearing ponds at both hatcheries have had recent upgrades to their predator control equipment. The WDFW Whitehorse rearing pond will have an electronic counter installed to accurately enumerate releases and losses of summer chinook as the fish leave the pond. Should predator losses continue to be significant, additional measures will be taken to further reduce predator access to the acclimation pond.

The Stillaguamish Technical Advisory Group and Stillaguamish Implementation and Review Group are developing specific habitat improvement objectives and habitat restoration projects needed to recover natural chinook productivity throughout the Stillaguamish watershed.

The Stillaguamish Tribe and WDFW are implementing monitoring and evaluation programs that include coded wire tagging, morphometric analysis, smolt trap outmigration characterizations, extensive spawning ground surveys and genetic analysis.

North Fork Stillaguamish Chum Managers Response

The Tribes and WDFW have agreed with the HSRG panel that the North Fork Stillaguamish chum program as outlined in October is not meeting its goals as an integrated harvest program. Our proposal is to change the goal of the program to an integrated education program. During the time that chum salmon are returning to the Stillaguamish Tribe's Harvey Creek hatchery, we have 600 to 1000 students from local school districts coming to the facility to observe both hatchery spawning and natural chum spawning that occurs in the stream adjacent to the hatchery. During their visit to the facility they also learn about the habitat and water quality requirements for healthy salmon populations and how humans have impacted salmon habitat.

The proposed integrated education program would involve downsizing the current integrated harvest program from 650,000 to a release of 200,000 chum fry at 400-600 fish per pound. This release would result in an annual return of 200 to 300 adults back to the hatchery. We would augment these returning hatchery fish each year with 10-20% wild chum exclusively from the North Fork Stillaguamish.

With the addition of a doubling of our current early rearing capacity scheduled to be in place by the fall of 2002, we can operate this chum program with no direct impacts to the chinook program and meet our target rearing densities of .25 pounds/cubic ft/inch for all species reared at this facility.

Using other species of salmon returning and rearing at the facility is not feasible for the following reasons. When we are spawning chinook in August and early September, students either have not returned from summer vacation or have just started school. Most of the classes that come for tours in late November and early December are studying about salmon as part of their class work and the field trips compliment that learning. Both our current coho program and the proposed modifications to that program don't provide enough fish for spawning for all the classes and coho rarely spawn in the stream adjacent to the hatchery, but instead move up higher in the watershed.

In addition to educational component to the program, the hatchery chum program provides a stable source of carcasses for the Sarvey Wildlife Care Center for use in the rehabilitation of injured wild animals. The hatchery chum program also makes eggs and carcasses available for tribal members who no longer fish and want fish for eating and smoking.

During 2002 grant proposals will be submitted to both the BIA (cyclical maintenance and rehab) and NWIFC (hatchery reform) to make significant improvements to the existing spawning shed location and disease transmission risks.

Funding has been secured through the HSRG hatchery reform grant process to expand early rearing capacity at the Stillaguamish Tribe's Harvey Creek hatchery. Additional early rearing capacity should be on line by the fall of 2002.

The co-managers will again evaluate the appropriateness of using Stillaguamish chum for the Maxwelton Supplementation program and discontinue the program if the stock is not appropriate.

South Fork Stillaguamish Chum Managers Response

This program is operated at the corrections facility in conjunction with educational staff at the facility. The individuals at this facility are used for stream restoration and fire control activities. Having them actively involved in the care and release of salmon helps them understand the connection between what they learn in their classes and the work that they carry out in the field.

The proposed changes for the program are that we will return to broodstocking 100% of the chum needed for the program from Jim and Siberia creeks, which run immediately adjacent to the Indian Ridge facility and are tributaries of the South Fork Stillaguamish. The eggs will be incubated at the Harvey Creek hatchery and then returned to the facility egg box for hatching and release.

During 2002 grant proposals will be submitted to both the BIA (cyclical maintenance and rehab) and NWIFC (hatchery reform) to make significant improvements to the existing spawning shed location and disease transmission risks.

Funding has been secured through the HSRG hatchery reform grant process to expand early rearing capacity at the Stillaguamish Tribe's Harvey Creek hatchery. Additional early rearing capacity should be on line by the fall of 2002.

Stillaguamish Coho Managers Response

The HSRG panel noted that one of the reasons they recommended putting this program into standby was because the run was healthy. Yet in the matrix, the stock status was noted as at risk. The SASSI status for this stock is depressed.

George Pess and others have noted significant losses of coho habitat. Off channel habitat has been critically diminished. Beaver ponds, sloughs and tidelands account for the majority of habitat lost in the last century. Between 67% to 91% of these habitats have been eliminated due to human land use altercations (Pess et al., 1999). Approximately 37% of summer and 21% of winter coho loss in tributaries is due to blocking culverts (Pess et al., 1999).

From 1992 to 2001, Stillaguamish tribal fishermen have only been able to have directed coho fisheries 3 out of 10 years and escapement levels have been met only 4 out 12 years during the 1988 –99 period (Drotts, per.comm.). Wild Stillaguamish coho have been and continue to be one of the key weak stock drivers limiting mixed stock coho fisheries throughout the Pacific Northwest region.

The HSRG scientific panel had a number of alternatives and recommendations concerning the current coho program. The tribe has reviewed those alternatives. The proposal is to modify the existing integrated recovery program to an integrated harvest/recovery program, where each year we capture 100% of our broodstock from the Fortson Creek fish ladder, which is a tributary of the North Fork Stillaguamish. This tributary has a consistently strong run of coho that occurs in the middle of the time period that coho are returning and spawning in the North Fork Stillaguamish.

Up to 45 pairs of coho would be captured each year, spawned using a 5 X 5 matrix cross and early reared at the Harvey Creek hatchery. Additional rearing would occur at the tribe's North Fork (Johnson Creek) hatchery (9,600 cu/ft.; 300GPM). These fish (50K) would be coded wire tagged for four consecutive years to evaluate the existing North Sound multi-generational hatchery indicator stock programs and how well they represent naturally spawning North Fork Stillaguamish coho.

The fish would then be transferred in April to a net pen located in Warm Springs Slough for final acclimation and release during mid-May. The Warm Springs Slough is an isolated slough located in Port Susan ¾ mile south of the mouth of Stillaguamish River, which receives freshwater drainage from agricultural fields. The water is pumped year round over the sea dike into the head of the slough.

Adult CWT tagged wild origin program coho would return primarily to the Warm Beach Slough with any strays returning to either the North Fork (Johnson Creek) hatchery or Fortson Creek. Returning tagged fish could be culled out of traps situated at both locations. In addition, both Fortson Creek and Johnson Creek would be surveyed to enumerate straying levels from the net pen. The returning hatchery adults would be available to tribal members and sports fishermen in an extreme terminal fishery at Warm Beach Slough with restricted fishing boundaries, which would minimize the interception of returning natural spawning coho.

Adults from the net pen that stray back to either to the Johnson Creek hatchery or the Fortson Creek trap would be available as a broodstock source if needed. If the returning adults were not needed for broodstock, then they would be given to tribal members, sold to a buyer, used by the wildlife recovery center or returned to local streams for nutrient recycling.

This program modification would address a number of concerns the HSRG raised about the existing coho program that the tribe operates. We would be increasing the number of fish released and using 100% wild origin broodstock. Additionally, this program would provide a limited consistent directed harvest located in an area that would minimize the capture of wild coho during years when the run is too weak for directed in river harvests. The program would provide additional tagged fish which are more wild in origin than the current multi-generational hatchery stocks currently used as surrogate indicator stocks for North Puget Sound wild coho populations, and coho broodstock would be available to use for reseeding under utilized or newly opened up habitat.

Why can't we capture outmigrant wild coho smolts to create an indicator stock? During the operation of smolt trap in the Stillaguamish mainstem during 2001 only 3,500 wild coho smolt were captured for the whole trapping season (Griffith, per. comm.). Results from outmigrant smolt trapping done by the Tulalip Tribes in the mid-1980's documented the time, difficulty and cost associated with capturing enough wild outmigrant coho for tagging (Nelson et al., 1997.) Capturing wild coho broodstock and then rearing their progeny in a large pond would be much more efficient then trying to capture wild outmigrant smolts.

Please note that the winter run steelhead program for the Stillaguamish Tribe has been officially terminated.

Thank you for taking the time to review these proposed modifications

Kip Killebrew
Stillaguamish Tribe

Appendix E: Tulalip Tribes Full Comments

Tulalip Tribes Responses to HSRG Regional Review

Snohomish Wild Summer Steelhead
HSRG wild steelhead management zones. As indicated in the text, the citation of Pilchuck Creek and the Tolt River are examples only. The Tulalip tribes will want to review the concept of wild steelhead management zones and the selection of particular zones before this concept is implemented. Also, it should be noted that Pilchuck Creek is in the Stillaguamish system.

Tulalip Summer Chinook
The HSRG states that the program should include mass marking to help maximize harvest rates and assess straying. It should be noted that the Tulalip summer chinook are mass-marked with thermal marks on otoliths. The co-managers believe that this is the only type of mass mark suitable for assessing straying when the simultaneous contribution of several different hatchery stocks to natural spawning areas is of interest and the hatchery stocks must therefore receive a unique mark. A visible mass mark, such as an adipose finclip, is necessary for these fish to contribute to selective fisheries. During the period of feasibility testing for the suitability of the summer chinook stock for rearing at Tulalip, 100,000 fish per year are receiving a CWT and AD/clip. During this period, the comanagers believe this is the only mass mark this group should receive. If and when the summer chinook become the broodstock of choice at Tulalip hatchery then the comanagers believe it would be appropriate to discuss whether to mass mark all or part of the production with an adipose finclip.

The co-managers appreciate the commendation from the HSRG regarding the otolith marking and recovery studies. It should be noted that, as well as stray rates, this study is being used to document the contribution of Tulalip hatchery fish to the terminal fishery. This allows us to manage terminal sport and net fisheries as selective fisheries using time and area management instead of selective retention regulations. This adds an important option to the toolkit for responsible management of hatchery fish.

Tulalip Hatchery fall chinook
See above comments on Tulalip summer chinook. During the period of summer chinook evaluation it should be noted that 100,000 Tulalip fall chinook per year are receiving a CWT and AD/clip.

The co-managers believe that the program should continue at current levels pending the outcome of the study of the feasibility of switching Tulalip chinook production to the summer broodstock.

Tulalip Bay Hatchery Coho
The HSRG suggests that this program “include mass marking”. It should be noted that this program currently includes CWT and Ad/clips on 50,000 smolts per year and mass marking of an additional 250,000 to 300,000 smolts per year with Ad/clips subject to agreement between Tulalip and WDFW.